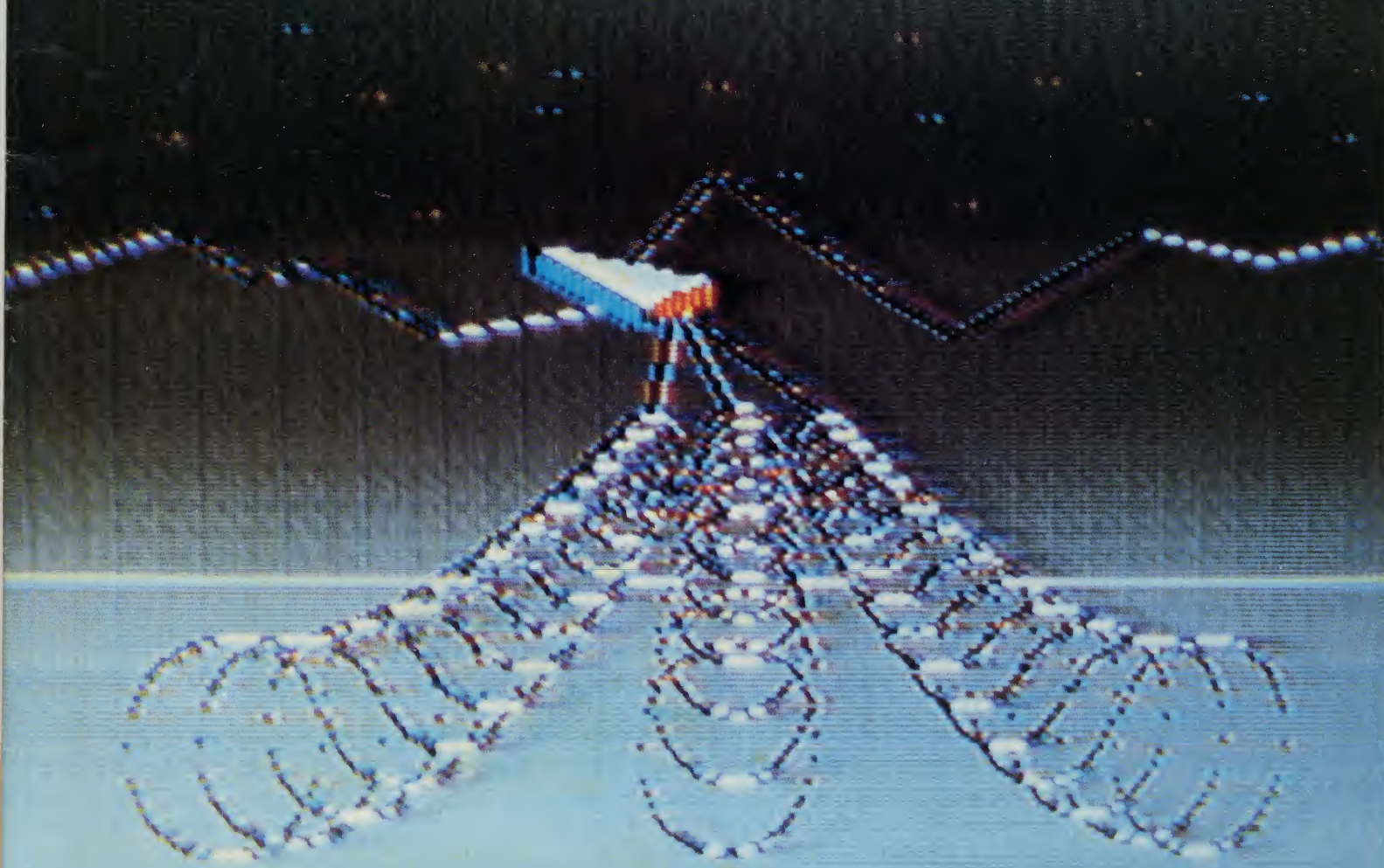


Vol. 1, Issue 6

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ROOM

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ROM STAFF

EDITOR
Peter Ellison

Publishers
Peter Ellison
Bob Cockroft

Art Director
Dave Bacon

Technical Division
Bob Cockroft
Jack Chung

Photographer
Jason Cockroft

Contributors:
Tim Reekie
Geoff Corry
Tom Tran
Gabe Torok
Tim Ruscheinsky

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EDITORIAL

Happy Anniversary ROM! We have completed our first year of publishing and thanks to you, we have really grown. We have tried to write the best programs and articles for the ATARI, including a machine language game in every issue. We hope that in the future we'll have some material from our large number of readers.

We started out with the entire magazine being printed out on an Atari 825 Printer, and as you can now see, typesetting. With each magazine now being done this way, we'll be able to squeeze a lot more information on to each page(it will also look nicer). Our paper quality has also improved. We have progressed from one-color, uncoated white paper to full color pictures and gloss.

With every issue we have tried to make each cover attractive and eye catching, and if at all possible, make use of the ATARI computer to create it. This cover is a color picture taken from the T.V. monitor of an Atari Computer. The cover shows a spaceship pulling a three-dimensional Atari Symbol through space. The program, written by Bob Cockroft, is listed inside this magazine to show how it was done. If you have any programs that you have written and think might look good on our cover, send them in.

In this issue we have once again kept our promise to have a machine language arcade game. The game called, 'Sky Warrior' is a four player shoot-em-up game. It uses player/missile graphics to animate each of the cloud riders to give it an arcade finish. The program was written by Jack Chung, author of 'Base Hunter', which appeared in issue four. This game should keep any arcade enthusiasts entertained for hours. Also, in this issue we have a new reviewer for you. His name is Gabe Torok, General Manager for Microwest Distributing (distributes all types of computer programs across the U.S. and Canada), we are glad to have his input in the magazine.

In this issue we have a Data Checker called, 'Pro-check'. This will help those that type in our programs find typing errors in them quite easily. We have had many requests for this program and know this will encourage more people to type in the program listings(especially the long ones). Our interview this issue features one with Richard Garriot alias Lord British. Being famous for Ultima I,II, and III, his success encourages any struggling programmer to strive for the top.

Thanks again for your support during our first year of publishing, and we expect that over this next year we will improve even more.

Peter Ellison
Editor/Publisher

LETTERS

Dear ROM:

My heart skipped a beat when I saw Volume 1, Issue 5 sitting on a shelf in an electronics & computer store that I had never been in before. I had dropped in at someone's suggestion to look for Back issues of Analog and Antic. I grabbed the last issue in stock and thumbed through. To my surprise a CANADIAN publication on the Atari. Wow! At last a Canadian voice on the best home computer available! And its a great magazine too!

Jim Jorrutsma
Downsview, Ontario

Dear Jim:

Thankyou for your compliments about our magazine. We hope that in the future we can make ROM the number one Atari magazine. Yes, we're Canadian but we're all Atarians, meaning we all think the Atari is the best.

Dear ROM:

I was quite delighted to discover a Canadian published rival to Antic and Analog in ROM magazine.

Shawn Golmon
Regina, Sask

Dear Shawn:

Thankyou for your letter, and we hope that you'll enjoy what we have in store for you over the coming year.

Dear ROM:

Here's my \$40.00 for the magazine and disk subscription. I think your off to a good start. You're also a trusting company to send me a magazine and disk before the cash, due to the non-acceptance of MasterCard. It's a spirit not usually seen in business today, but I think it's a great spirit. It almost makes me feel like a friend.

If ever I can help you with the disk subscription in the USA, let me know.

Helen Dougher
Harrison, NJ

Dear Helen:

Thankyou for such a kind letter. We at ROM want to get to know our readers personally so we can share their experiences with the Atari. We're thankful for every letter that comes in because it's an encouragement to each one of us. Keep up the good work.

Continued on Page 12

ANNOUNCING A MAJOR BREAKTHROUGH FOR ATARI COMPUTERS:



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Error Handling	☐	☐	☐	☒

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INTERVIEW:

Richard Garriot (Lord British)

Interviewed by Peter Ellison

Richard Garriot (Lord British) co-founder of Origin Systems is known for his creations of Ulitma I,II, and III. Richard and his partner, Charles Bueshe, in the past year have made quite an impact on the computer software market.

Q. When did you first become interested in computer programming?

A. It goes way back to my freshmen year in high school. Although I was living in Houston, my Dad got a fellowship from NASA, where he works as an Astronaut, to go back to Stanford University (where he used to be a professor) and take some updated electronic courses. The whole family moved out there for nine months, one school year. While I was out there, I went to a high school that was made up of primarily University professors' kids. Because of that, the school had a very high engineering oriented curriculum. That one school district had three big mainframe computers, just to itself. It had a HP-2000 an HP-3000 and the language department had its very own computer though they didn't even know what it was. What this all means, is that in the school I went to, virtually every classroom had a computer terminal in it and it was just about impossible to get involved to some degree in computers. That was quite a way back when most high schools didn't have any computers at all.

Q. What was the first computer that you owned?

A. The first one that I owned was an Apple, and I got it when I graduated from high school. My father and I split the cost on an AppleII. The AppleII plus came out about two weeks after I bought my first Apple, and since I was working at the time at a Computerland store, I traded my AppleII in for a AppleII plus immediately.

Q. Did you go to University after finishing high school?

A. Yes, I went to the University of Texas and have never completed my degree, but I was studying electrical engineering. I went for two and a half years and then transferred to the University of Houston, so that I could continue other work. Although I'm not in school right now, I would like to eventually finish my degree.

Q. What was the first program which you sold commercially and for what company?

A. The first program was called 'Akalabeth'. The last three years in high school I was actually writing fantasy role playing games on the schools' computer, and during that time completed twenty-eight different ones. My school didn't have a teacher beyond first year to teach computers, so, actually, this was a

course that I had all to myself, with basically no teacher and a guaranteed "A" grade. Then when I got my Apple, the first logical thing to do was to turn around and write one of these games I had written on the schools' computer, onto the personal computer. 'Akalabeth' was actually a rewrite of my 28th school computer game. It was sold through a company by the name of California Pacific.

Q. When was Origin Systems started and by whom?

A. It was started exactly a year and one month ago by myself, and Chuck Bueshe, who is also a nationally published author. We both used to publish through Sierra On-line just before we started this company. Also, he was a roommate at college, so we've known one another for quite a while. Also among the founders of this company is my older brother, Robert Garriot, and my parents, who became fairly small investors.

Q. How big is the programming staff at Origin and are there any freelance programmers outside the company?

A. Technically everybody is freelance, including myself. Chuck (Charles Bueshe) and I actually work in the office, so we call ourselves resident freelancers. We're the only two resident freelancers, but we do have three outside freelancers who do both translations and some original work. Also Andy Greenburg, author of Wizardry(tm), is working for us. He is currently working on a new game called, 'Ogre'. That should be ready in the next couple of months.

Q. How did you think of the name Lord British for a pen-name?

A. Lord British was a name which was given to me by accident. In my Sophmore year in high school, I went to the University of Oklahoma to take some summer high school non-credit courses. The first thing to do when I got to my dorm was to take my stuff and throw it on my bed. There were a few people that had come ahead of me and were already in the dorm. They came over and knocked at the door and I said, 'Come in.' They came in and said, 'Hi' and I said, 'Hello'. They said, 'Hello?' Nobody from around here says hello, you must be from Britian, so we'll call you British. The reason why the name stuck, was later I found out that I was really born in Cambridge, England. Although I only lived in England for one month of my life, its not like I could have picked up an English accent.

Q. Did Dungeons & Dragons inspire a lot of your ideas in the Ultima series?

A. Although Dungeons & Dragons was the first

fantasy role playing game I learned, it wasn't the only game, because there are so many others quite similar. I think I was influenced by a great variety of them, although the fantasy role playing games like D & D, played a big role in it.

Q. How long did it take you to program UltimaI, UltimaII, and UltimaIII?

A. Each one seemed to take about the same amount of time, one year. That's really been kind of luck, as they each tend to come out around Christmas time, which is a good time to come out, but it was never intentional, up until this year. Now that I'm working on UltimaIV, everybody is kind of expecting it by next Christmas and UltimaIV is a far bigger game than any of the previous Ultimas that I have written. It is somewhat debateable whether it will make it for Christmas this time.

Q. How long does it take Chuck to make the conversions?

A. Chuck is a very fast converter. He does really good work and so Chuck can usually do a conversion in two to three months.

Q. When creating your games, do you first sit down and design all of the map before actually sitting down and programming it?

A. Even though that is the way your supposed to program, I don't. In fact I program very much on a real time basis, where I basically say, 'Let's start in'. I virtually have little idea of what it will be like when I start in except what I usually try to do is vastly improve the graphics with each coming Ultima. I also have a pretty good idea on what I want to accomplish with the graphics. The very first thing that I do are the graphics. I start out by getting you to be able to move around a map. Then I make an editor that will allow me to make the map itself. Then I draw the continent, which the game is played on, very carefully. This whole process takes about one month. I then make a character that can move around on the newly created continent. I then see that he needs foes to fight, so I add monsters to the game. After this I create a town which he can go to and buy things. Then I realize this is all good, but he needs some quests to go on. So I add some different tasks which the player must accomplish. So I basically build the game as I'm going.

Q. Did you help Chuck in the converting of UltimaIII to the Atari?

A. Somewhat, whenever there was any need. Since he is only, somewhat, fifteen feet away from me, he can just give a holler. He really does every inch of work in the conversion, although he does have some questions to ask me, just because I write really sloppy code.

Q. After playing UltimaIII for over a month, we have had the game jam a few times. Has this problem

been fixed?

A. The first few disks which were sent out had a few glitches in them, but as far as I know, these problems have now been fixed.

Q. The music for UltimaIII was very good. Did the same person do the music for the Apple version?

A. The music was initially done on the Apple and Chuck managed to get it working on the Atari.

Q. Was any special sound software used to create the music?

A. The fellow who composed the music to let it run on the Apple wrote almost all of his own editors, although he actually started out with the music system called, 'the Alf Music System'. He would write it with the Alf system and then he would have to translate it into his style of code.

Q. Where do you get all of your innovative and creative ideas?

A. Many, many, many, different sources. I'm a big movie fan, and UltimaII is centered around the movie, 'Time Bandits' and parallels the movie closely. That's actually the most I have ever drawn from a movie. I used to be really big into Dungeons & Dragons and that sort of stuff, of course, but we used to play very differently. We never really played by the rules, and we had very few encounters with creatures. Most of the time it was: you would enter a room and there was a puzzle to solve in the room, a technology oriented trap. I would get ideas from the different traps and puzzles that I would run, or people ran against me. You could say I plagiarize everybody, in that, I take things from all areas of my life.

Q. In what direction do you see computer games going?

A. When I first got into computers, arcade games seemed to be where it was at. (the action shoot-em-up) The whole industry is now taking a very strong push into the direction where a game has to have a lot of strategy and role playing. It has to be a full-blown entertainment package. That is the way everybody is heading and, fortunately, is very close to where I have been. Each Ultima has sold at least triple the former Ultima and I'm very optimistic for UltimaIV. UltimaIII has been number two on Softsell best sellers list for quite a while.

ACTION!

The New Language For ATARI!

Reviewed By PETER ELLISON

When it came to programming the Atari for speed there were a few choices that a programmer could choose. First there was assembly language(hard to debug), then Forth(who wants to do everything backwards), and now ACTION!(the new super language from OSS). This language which comes in an attractive orange cartridge similar to ATARI basic, is in my own opinion, one of the greatest things to happen to the ATARI.

The language is called ACTION!, because that is what it is, FAST!. Though it is a little harder to learn then Basic, Action! offers the speed of machine language with the ease of use. Before I had ever seen Action! I had programmed in Assembly language, Basic, Forth, Pascal, and Fortran but now ACTION! has arrived, it has given me a whole new view of programming. Action!, which is similar to Pascal, is easy to pickup if you have ever done any work in a structured language. It has PROCEDUREs(PROC), FUNCTIONs(FUNC), and the declaration of Data types.

The ACTION! system is made up of five different parts. They are: The ACTION! Monitor, the ACTION! Editor, the ACTION! Language, the ACTION! compiler, and the ACTION! library. The monitor is the main part of the language, in that it allows one to access either the Editor, or Compiler, or to get access to some other system options, such as DOS. The Editor is simply a text editor with which you do all of your programming before you are ready to compile it. I especially like the editor because of its' great speed. The cursor for editing goes seemingly five times faster than any text editor that I have worked with. I know when programming in Basic how slowly the cursor moves and therefore how frustrated I become when it doesn't move any faster.

I feel that the text editor in itself is worth the price of the cartridge. For doing word processing it works like a dream. The editor allows you to put up to 240 characters long on one single line, although the screen shows only 38 characters at a time. It does this by scrolling to the left and right to show the rest of the



line. To scroll left, right, up, or down, all that is needed is the ctrl arrows. You can also set the length of each line for say; your printer, etc., and when you come to the end of that line the editor will buzz. The editor makes it easy to move whole chunks of text from one location to another, giving the user the ease of changing an entire program around. One last thing about the editor, it allows you to split your screen into two windows giving you the ability to edit two different programs or parts of a program at the same time.

The ACTION! Language is what you use to communicate with the ATARI machine and tell it to do things. You write a program in the ACTION! Language, and then tell the ACTION! compiler to translate it into machine code. This is what gives the language such great speed. Finally the ACTION!

Continued on Page 12

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Action (cont'd)

Library is a group of prewritten routines which you can use in your programs. This group allows you to use commands found in Basic, like PLOT, DRAWTO, PRINT, etc. and a lot more without having to write your own subroutines. Plans have also been made to have a disk containing player/missile subroutines that will be available from OSS.

The instruction manual is a small yellow binder containing 208 pages of information. Although I found the book very useful and easy to understand, many probably wouldn't. The reason for this is that I'm already proficient in programming Pascal which is very similar to ACTION!. Someone who has just learned Basic might have a little trouble understanding the manual. The book is good except that it doesn't go into enough detail explaining certain things that I'd take for granted. I know that it must be hard to write an instruction manual, but I must say it's a lot better than the Basic manual you get with your ATARI.

ACTION! is a good alternative to BASIC, which is very slow and inhibited, and furthermore Assembly language is difficult to learn. Now to say a bit about the speed of ACTION!. Tests have been carried out to compare the speed of execution between BASIC and ACTION! with some rather surprising results. ACTION! was shown to generate code 200 times faster than BASIC. This great speed gives the user the ability to create fast-action arcade type games with the similar surroundings of Basic. Although converting a Basic program line by line to ACTION! would execute much faster, there is a much better way of doing this. Instead of converting each individual line, it is better that the programmer become familiar with how ACTION! is structured before trying to convert a Basic program. This will give the user a lot more speed and flexibility with the final program.

We at ROM have enjoyed ACTION! so much that we are going to have a special column in each issue devoted specifically to programming in ACTION!. In it different programming techniques will be discussed and maybe even a few games. If you have any suggestions regarding what you would like to see in this column, send them to us, we'd be happy to listen. Now get out and buy one of the best programming language for the ATARI, ACTION!.

Letters (cont'd)

Dear ROM:

I recently purchased the Atari 664-XL for my son, Michael, who is 12 years old. I was just getting to know the computer but my son knows more than me about its' operation.

I have been getting "Antic" magazine for a few months now and it is a good magazine. However, last week, at a small computer store, I purchased my first copy of "ROM" magazine. My son and I only describe "ROM" magazine as #1. I will tell all my friends about "ROM".

Do keep up the good work.

Noel Viridi
Vancouver, B.C.

Dear Noel:

That is quite a compliment. As I have stated in the Editorial, we have tried to improve with every issue. The support of you, our readers, is of great assistance in this endeavor.

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BEGINNER'S LINE GOING TO TOWN PROJECT

by Geoff Corry

In the last issue, we introduced a new project for this column. A graphic adventure game that will be built over the next several issues, covering the various techniques that are used to produce interesting displays and a smooth running program. This project will produce a program that will work with a 16K memory computer and tape storage or a 48K machine with disk storage. We will use some special routines to hold the player's interest, while the next section of the program is loading. During the building of this program, we will find out how to use special programming techniques such as scrolling, page flipping, player/missile graphics, etc. to produce a professional style to this program.

How Is Your Memory?

This question might strike you as being strange. But a significant characteristic of successful people is, that they have all had excellent memories. For the same reason, computers have also been successful, because they never forget. That is, if you don't forget to save things before you turn off the power.

Let's look at our own computer's memory, not to see how good it is, but to make sure we have enough when we need it. If your computer has 16K bytes of useable memory, we must be extra careful in how we design our program to get it to work well.

Your computer has printed circuit cards with rows of black rectangular chips which house the electrical memory units. The 400 and 600XL have memory boards, permanently wired inside, that are equipped with 16x1024 or 16384 memory cells that can each hold one byte (any number from 0 to 255) of information. You can upgrade the 400 by having the board replaced by a 48K board, whereas the 600XL just requires the addition of a memory expansion unit that plugs in the back. The Atari 800 computer uses three 16K modules, for a maximum of 48K of Random Access Memory.

The two sets of numbers refer to the memory cells available to a 16K memory computer with tape storage or a 48K memory computer with disk drive. The disk operating system requires a considerable amount of memory.

Here is a short program that we will use from time to time to check on our memory usage. The second

Here is a brief memory map of the main areas that we need to store the Basic program and the special graphic features:-

...	...
65535	
Read Only Memory	
40960	
16383 40959	
Screen Memory	
15424 40000	
15423 39999	
Display List	
15392 39968	
!	!
!	!
!	!
3041 8443	
Small Basic Program	
(See below)	
1792 7420	
1791 7419	
Operating System	
Random Access Memory	
0000 0000	
TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT OOOOOOOOOOOOOOOOOOOOO	

area from the bottom in the above memory map shows the memory required to operate this program. Here it is:-

30000 REM This MEMADDR utility looks at the starting addresses of blocks of memory used in BASIC programs.

```

30100 RAMTOP = PEEK(106)*256-1
30120 ? "THE TOP END OF USABLE MEMORY
=";RAMTOP
30130 SCREEN = PEEK(88) + 256*PEEK(89)
30140 ? "START OF SCREEN MEMORY
=";SCREEN
30150 DLIST = PEEK(560) + 256*PEEK(561)
30160 ? "START OF DISPLAY LIST =" ;DLIST
30210 mEMTOP = PEEK(144) + 256*PEEK(145)
30220 ? "TOP OF YOUR BASIC PROGRAM
=";MEMTOP
30230 STMTAB = PEEK(136) + 256*PEEK(137)
30240 ? "START OF STATEMENT TABLE
=";STMTAB
30250 VVTP = PEEK(134) + 256*PEEK(135)
30260 ? "START OF VARIABLE VALU TABLE
=";VVTP
30270 VNTP = PEEK(130) + 256*PEEK(131)
30280 ? "START OF VARIABLE NAME TABLE
=";VNTP
30290 LOWMEM = PEEK(128) + 256*PEEK(129)
30300 ? "START OF BASIC MEMORY BUFFER
=";LOWMEM;?
30310 ? "SUBSTITUTE YOUR LOW & HIGH
NUMBERS IN THE NEXT LINE, TO SEE
WHAT IS IN THAT AREA OF MEMORY:~"
30320 ? "FOR A=(LOWNUM) TO (HINUM):?
CHR$(PEEK(A));CHR$(32);:NEXT A"

```

Type in this memory address program and LIST it to tape(LIST"C:"), or to disc(LIST"D:MEMADDR"). Please use the line numbers as shown, as we will be adding the missing lines later. We have used high numbers so that we can merge it with our main program sections without writing over existing lines.

Now that you have stored it, type NEW and press RETURN. Retrieve it by rewinding the tape and typing ENTER"C:" or for those with disc drives, type ENTER"D:MEMADDR". When a program is stored in this manner, it can be entered on top of an existing program, whereas the LOAD command wipes out any previous program that was in memory.

Now run it and you will see a list of numbers for each line. If you look at the above memory map, some or most of these numbers will be there depending on the amount of memory in your computer, and what type of storage device is connected. These numbers are actual storage locations in your computers memory, and in most cases are the start of a block of memory assigned for a certain function. At present these blocks are sized to take care of the program we entered. A larger program would increase the size of these blocks and change the starting locations. The list should look like this. If you have some other combination of memory size and storage device, you will

get a different set of numbers.

	16K & TAPE	48K & DISK
THE TOP END OF USABLE MEMORY		
	16383	40959
START OF SCREEN MEMORY		15424
	40000	
START OF THE DISPLAY LIST		15392
	39968	
TOP OF YOUR BASIC PROGRAM		3041
	8669	
START OF STATEMENT TABLE		2156
	7784	
START OF VARIABLE VALUE TABLE		7720
	2092	
START OF VARIABLE NAME TABLE		2048
	7676	
START OF BASIC MEMORY BUFFER		7420
	1792	

As you can see, a 16K memory size has a lot less free memory between the top of this BASIC program and the start of the display list. The areas between each of the above memory locations will vary, depending on the size of the program and what it does. The only things that remain fixed, are the TOP END OF USABLE MEMORY and the START OF BASIC MEMORY BUFFER. All your BASIC programs use more or less of this space.

Maybe you are getting curious as to what the names of these memory locations are all about. Well, here goes anyway. Starting at the top is the last memory location you can change in a BASIC program. Everything above that is fixed in place at the factory or is used by your plug-in BASIC cartridge. From the START OF SCREEN MEMORY to the TOP END OF USABLE MEMORY is the actual information that creates the screen display. This information changes with each change of picture or text. It has to be remembered, because the T.V. is not intelligent and has to be reminded 60 times a second of what goes where.

Below the screen memory is the display list, which is a set of instructions to a special microprocessor hidden deep inside the computer, known as ANTIC. (Yes, it's a magazine too!) The ANTIC chip controls the function of each graphic mode. Right now we are in GR. 0 text mode. If you take your cursor up the screen with the CTRL + arrow keys, you can modify that last line in the display. Before you do anything, please jot down the set of numbers at the right of each line. I will tell you more about that later. Now let's type over '(LOWNUM)' with the number beside START OF DISPLAY LIST. Then CTRL DELETE, 3 times to get rid of 'UM)'. NOW CTRL right arrow along to '(HINUM)' and type in the number beside START OF SCREEN MEMORY. Type 2 more CTRL

DELETE's to get rid of 'M)', and CTRL right again to 'CHR\$'. CTRL DELETE four times, to get rid of this for now. Don't worry, it will come back when we rerun the program. Now hit RETURN. Hey presto! — our display list. It should look like this:-

16K & TAPE

```
112 112 112 66 64 60 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 65 32 60 0
```

48K & DISK

```
112 112 112 66 64 156 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 65 32 15
6 0
```

These cryptic instructions tell ANTIC to leave three sets of 8 blank lines at the top of the screen. Most of this is hidden above the T.V. window. The next instruction we will hurry through for now, except to say that the 66 is actually 64 plus the ANTIC display mode. More confusion, ANTIC has 16 display modes of which BASIC uses 8 (not counting GTIA modes 9 to 11). ANTIC mode 2 is the same as GRAPHIC mode 0 in BASIC. Whew! I'm glad that works out. The next two numbers make up the starting address of the screen memory (at least we know all about that!). If you look at line 30130 of the program listing, you will see that we took the first number and added it to the product of 256 times the second number. Well ANTIC does the same and comes up with:-

16K & TAPE	$64 + (256 * 60) = 15424$
48K & DISC	$64 + (256 * 156) = 40000$

Well, at least that worked out. Now if you count the number of 2's and add the one buried in the 66 that we talked about, you should come up with the number of GR.0 lines on the screen, that's right— 24. Next, the 65 is a jump command to start putting the next set of lines on the screen. The last two numbers, 32 and the split 156 are combined as above, to give the starting address of the display list. That 0 at the end is the first byte of the screen memory, showing that nothing special goes up at the left top of the screen (not counting dust!). If you want to delve into the mysteries of the display list, try Chapter 2 of DE RE ATARI, Page 294 of YOUR ATARI COMPUTER, or Chapter 2 of ADVANCED PROGRAMMING FOR YOUR ATARI, a 1983 TAB book by Linda Schreiber.

There is a large area below the display list, right down to the top of BASIC memory, that BASIC uses as a scratch pad to handle each instruction in turn. The 6502 microprocessor, which does all the work, doesn't understand BASIC. So the BASIC cartridge has an interpreter inside that converts all the statements into machine language subroutines as it exe-

cutes the program. For those who wish to dig into this, see THE ATARI BASIC SOURCE BOOK from COMPUTE! Books, by Bill Wilkinson, Kathleen O'Brien, and Paul Laughton. A quick example; if your program was running along and came to a PLOT command, it would first see it as a token number 44, which is how PLOT is stored. It then executes it by jumping to a position routine. Now load in the color of the point, find out where you want to plot it, screen or printer, and it sends it to screen memory (or to the printer buffer). All this is done in several machine language steps, '9' for the position subroutine, '1' to get the color, '1' to get the output device, and '9' more to print it. Also within the position and print subroutines, it will branch down into other subroutines. So you see, it is much simpler to say PLOT in BASIC, than to go through all the minute steps of machine language, but we pay the price in extra memory required for BASIC to interpret and execute each command as it comes along.

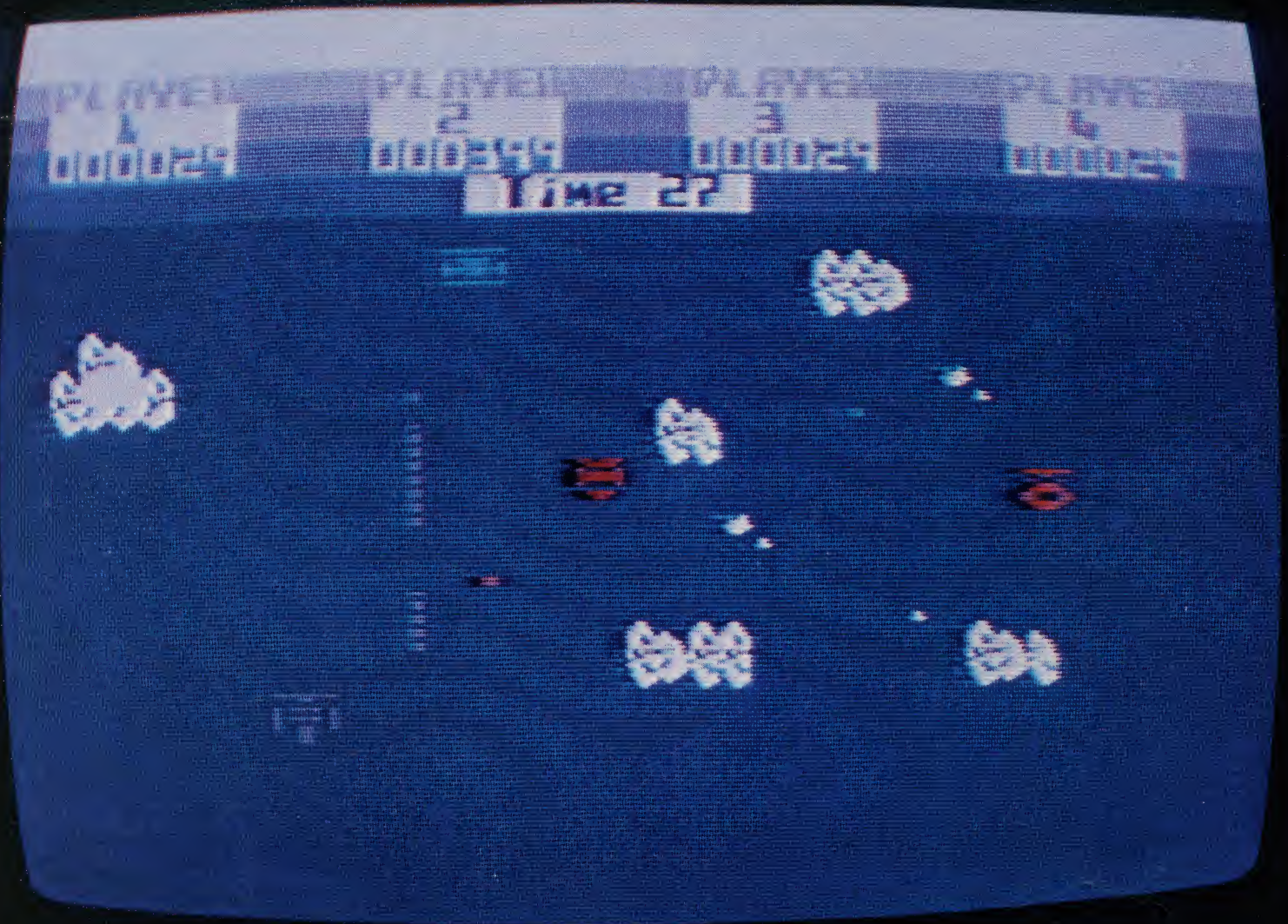
Now that you have looked at the higher memory locations used during the running of a program, let's now look at the area that stores the BASIC program itself. Run the program again. Remember the list of numbers I asked you to jot down. Compare this list with what you see on the screen. You will see that the numbers beside the top of BASIC memory, start of statement table, and variable value table have all increased. This is because when we went into the last line of the display, changed it and hit RETURN, converting the line from a printed line, (see line 30320 in the listing), to an immediate command. This is now added to the BASIC program and it had to find room for the FOR and NEXT command, and added the variable 'A'.

Go back and modify our immediate mode line again. Substitute the number against START OF STATEMENT TABLE for (LOWNUM). Get the number against TOP OF BASIC PROGRAM, subtract 1, and substitute it for (HINUM). DON'T hit RETURN yet, but CTRL uparrow to the top of the screen. Now SHIFT DELETE a few times carefully until the immediate action line is at the top of the screen. When you press return, you will see the program scroll up. Some of the program will be recognizable, but there are some funny graphic symbols mixed in. These are the ATASCII versions of the BASIC command tokens for the program. The FOR and NEXT commands are now tokens 8 and 9, which are the ATASCII triangle and small box symbols respectively. Each letter and token is separated by a space not normally in memory, but put in by our immediate action line (CHR\$(32)) to stop everything from running together.

You have now seen where this BASIC program is stored. Now let's skip the variable value table for the

SKY WARRIOR

By JACK CHUNG



On the planet Clarexa, people have resorted to living in the clouds, due to the large population on the planet's surface. With this movement to the clouds many small wars have been started between citizens that live on the surface and want the cloud people to leave. This squabble has caused dissention in four different races. Each race has sent their top pilots to battle it out in the clouds. The combat takes place in the clouds with each combatant inside his or her own sky rider. These ships can fly in eight different directions in order to do combat. Once combat begins, there is no stopping the battle. Warriors can hide behind clouds to evade its pursuing enemies and vice versa. This can also be a good tactic when wanting a surprise attack.

Since each race has its own type of flying machine, it is able to tell the four apart when in close combat. Each pilot tries to maneuver his own craft into position so that he can blast the other one's ship. The type of weapons that are used are very primitive, since the colonies before this time had been very peaceful. For this reason their bullets, when shot, will fall in an arc, due to gravity. If this shot hits any one of its foes vessels, the ship will be destroyed. The ship will only stay destroyed for a minute before another member of that same race is back in another ship. Each colony has agreed on the way the combat should take place.

There will be no suicide missions in that no one can deliberately run into another one's craft. This is enforced by installing a special radar device in each craft, making it impossible to accomplish such a feat. Also, only a small designated area will be used for the combat, so as not to harm any of the citizens. This combat zone cannot be flown out of due to a special forcefield surrounding the area. With this in mind each pilot must be able to dodge enemy bullets in order to survive. To become the champion, one must shoot down the largest number of "flyers". This amount is decided upon by the players at the beginning of the game. The winner of the combat is the one who will lead the cloud people in their fight against the surface people.

The story above gives a brief outline on how the game "Sky Warrior" is played. Each player (up to four) controls his own "flyer" by moving it around the screen with a joystick. It can be flown in all eight directions. To fire bullets, just push the red fire button on the joystick and move in the direction that you wish to fire. The game is based on points, in that at the beginning of the game you choose how many points are needed to win. This can make for either a long or short game depending on the players. This game was written in assembler language through the use of the Synassembler. Each ship was animated through the use of player/missile graphics. The clouds and scoring were produced through character graphics

in Basic.

To play the game, you only need to type in the Basic listing. The assembler listing is printed for those people wishing to see how the program was actually made. If typed in and assembled, it will produce the same game as the basic listing, without the re-defined character set. **This game runs on 48K and can be played by 2 to 4 players with joysticks. This game can be acquired by sending in \$3.00 and a blank disk and cassette to:**

**ROM MAGAZINE
P.O. BOX 252
Maple Ridge, B.C.
Canada
V2X 7G1**

Basic Listing

```

1 REM ***SKY WARRIOR*****REQUIRES
2 REM ***BY JACK CHUNG***48K and
  Joystick
3 REM ***ROM ISSUE 6*****
4 DIM SCORE(4):POKE 755,1
5 GOSUB 9000
6 FOR I=1 TO 4:SCORE(I)=0:NEXT I
10 GOSUB 1000
19 GRAPHICS 0:POKE 559,0:POKE 752
  ,1:POKE 756,PEEK(106)-24
20 ? :?
30 ? "      Player      Player      Player
      Player"
32 ? "      1              2              3
      4      "
34 ? "      "
      "
36 ? "      MAXIMUM SCORE=";
MAX
40 FOR I=1 TO 10:X=INT(30*RND(1)+
5):Y=INT(10*RND(1)+6):A=INT(3*RND
(1)+1)
50 IF A=1 THEN ? CHR$(2);CHR$(29)
;CHR$(30);CHR$(30);CHR$(30);CHR$(
30);CHR$(3);CHR$(4);CHR$(3);CHR$(
4);CHR$(1)
55 IF A=1 THEN POSITION X,Y:? CHR
$(2);CHR$(29);CHR$(30);CHR$(30);C
HR$(30);CHR$(30);CHR$(1)
60 IF A=2 THEN POSITION X,Y:? CHR
$(5);CHR$(4);CHR$(5);CHR$(29);CHR
$(30);CHR$(30);CHR$(7);CHR$(8);CH
R$(7)
90 NEXT I:POKE 559,62
100 U=USR(24576)

```


Basic Listing (cont'd)

```

102 A=PEEK(1536):A=A+1:SCORE(A)=S
CORE(A)+10
103 POSITION ((A-1)*9)+4,4:? SCOR
E(A)
104 IF SCORE(A)>=MAX THEN 2000
110 U=USR(24761)
120 GOTO 102
1000 GRAPHICS 0:SETCOLOR 2,0,0:PO
KE 752,1:SETCOLOR 0,7,4:SETCOLOR
1,8,8:POKE 756,PEEK(106)-24:TRAP
1000
1010 A=PEEK(560)+256*PEEK(561)+5

1020 POKE A+1,7:POKE A+2,7:POKE A
+3,6:POKE A+4,6
1100 POSITION 4,1:? "SKY WARRIOR"

1110 POSITION 3,2:? "By Jack Chun
g"
1200 FOR I=1 TO 4:FOR T=0 TO 15:S
ETCOLOR 0,3,T:SETCOLOR 2,7,T:NEXT
T:NEXT I
1300 POSITION 2,4:? "What is the
maximum score to win";:INPUT MAX

1400 RETURN
2000 GRAPHICS 0:SETCOLOR 2,0,0:PO
KE 559,62:FOR I=0 TO 7:POKE 53248
+I,0:NEXT I:POKE 756,PEEK(106)-24

2001 SOUND 0,0,0,0:SOUND 1,0,0,0:
SOUND 2,0,0,0
2010 POKE 752,1:SETCOLOR 0,7,4:SE
TCOLOR 1,8,8
2020 ? :? "PLAYER ";A;". CONGRATU
LATIONS SKY WARRIOR!"
2021 ? "YOU ARE THE NEW EMPEROR O
F THE CLOUD PEOPLE"
2023 ? "YOU RULE THE PLANET CLARE
XA!"
2030 ? :? "Press START to begin"

2040 IF PEEK(53279)=6 THEN 6
2050 GOTO 2040
9000 ? "PLEASE WAIT A MINUTE..."

9005 RESTORE 10000:FOR I=24576 TO
26112:READ X:POKE I,X:NEXT I
9010 RESTORE 20000:FOR I=34816 TO
35840:READ X:POKE I,X:NEXT I:RET
URN
10000 DATA 104,169,0,141,48,2,169
,100,141,49,2,165,88,141,4,100,16
5,89,141,5,100,169,58,141
10010 DATA 47,2,169,3,141,29,208,
169,112,141,7,212,169,1,141,111,2

```

```

,169,192,141,14,212,169,33
10020 DATA 141,0,2,169,100,141,1,
2,160,0,152,153,0,116,153,0,117,1
53,0,118,153,0,119,153
10030 DATA 0,115,200,208,238,169,
0,141,198,2,169,116,141,192,2,169
,52,141,193,2,169,84,141,194
10040 DATA 2,169,132,141,195,2,16
9,0,133,204,169,116,133,205,172,7
8,99,185,41,99,240,6,32,230
10050 DATA 98,76,186,96,32,249,96
,172,78,99,185,53,99,24,105,1,153
,53,99,185,73,99,24,105
10060 DATA 1,153,73,99,32,157,97,
172,78,99,185,65,99,240,27,32,49,
98,32,206,97,32,114,98
10070 DATA 173,45,99,240,13,172,7
8,99,140,0,6,169,0,141,45,99,96,1
04,238,78,99,230,205,173
10080 DATA 78,99,201,4,144,168,16
9,0,141,78,99,32,30,99,174,46,99,
224,64,208,18,162,0,142
10090 DATA 46,99,162,10,142,0,210
,162,132,142,1,210,76,246,96,162,
64,142,46,99,162,0,142,0
10100 DATA 210,162,10,142,1,210,7
6,102,96,172,78,99,185,120,2,170,
138,41,1,208,26,185,73,99
10110 DATA 56,233,2,153,73,99,76,
31,97,138,41,2,208,9,185,73,99,24
,105,1,153,73,99,138
10120 DATA 41,4,208,9,185,69,99,5
6,233,1,153,69,99,138,41,8,208,9,
185,69,99,24,105,1
10130 DATA 153,69,99,185,65,99,20
8,83,185,132,2,208,78,169,1,153,6
5,99,185,69,99,24,105,3
10140 DATA 153,49,99,185,73,99,24
,105,4,153,53,99,185,120,2,201,15
,240,48,201,14,208,8,169
10150 DATA 1,153,61,99,76,147,97,
201,13,208,8,169,2,153,61,99,76,1
47,97,201,7,208,8,169
10160 DATA 4,153,61,99,76,147,97,
201,11,208,9,169,3,153,61,99,76,1
47,97,96,169,0,153,61
10170 DATA 99,153,65,99,96,172,78
,99,185,69,99,153,0,208,172,78,99
,152,10,10,10,10,24,109
10180 DATA 46,99,170,185,73,99,16
8,189,95,99,145,204,200,232,238,4
8,99,173,48,99,201,16,144,239
10190 DATA 169,0,141,48,99,96,172
,78,99,185,49,99,141,4,210,169,13
6,141,5,210,185,61,99,170
10200 DATA 224,1,208,16,185,53,99

```

Basic Listing (cont'd)

,56,233,4,153,53,99,201,30,176,3,
76,94,98,224,2,208,16
10210 DATA 185,53,99,24,105,4,153
,53,99,201,230,144,3,76,94,98,224
,3,208,16,185,49,99,56
10220 DATA 233,4,153,49,99,201,40
,176,3,76,94,98,224,4,208,16,185,
49,99,24,105,4,153,49
10230 DATA 99,201,200,144,3,76,94
,98,96,172,78,99,169,1,141,31,208
,185,49,99,153,4,208,174
10240 DATA 78,99,185,53,99,168,16
9,0,136,153,0,115,200,189,223,99,
153,0,115,200,153,0,115,200
10250 DATA 169,0,153,0,115,96,169
,0,153,65,99,141,4,210,141,5,210,
169,0,153,0,115,200,208
10260 DATA 250,96,172,78,99,185,8
,208,240,107,141,47,99,169,1,141,
30,208,173,47,99,41,1,201
10270 DATA 1,208,16,169,0,205,78,
99,240,83,169,1,141,41,99,141,45,
99,96,173,47,99,41,2
10280 DATA 201,2,208,16,169,1,205
,78,99,240,58,169,1,141,42,99,141
,45,99,96,173,47,99,41
10290 DATA 4,201,4,208,16,169,2,2
05,78,99,240,33,169,1,141,43,99,1
41,45,99,96,173,47,99
10300 DATA 41,8,201,8,208,15,169,
3,205,78,99,240,8,169,1,141,44,99
,141,45,99,96,172,78
10310 DATA 99,169,168,141,3,210,1
85,73,99,24,105,1,153,73,99,141,2
,210,168,162,0,189,79,99
10320 DATA 145,204,200,232,224,16
,144,245,172,78,99,185,73,99,201,
250,144,11,169,0,153,41,99,141
10330 DATA 2,210,141,3,210,96,169
,0,133,20,165,20,201,2,144,250,96
,0,0,0,0,0,0,0
10340 DATA 0,0,0,0,0,27,27,27,27,
0,0,0,0,0,0,0,0,0,0,0,112,120,1
30
10350 DATA 140,127,137,147,167,0,
0,0,60,86,171,213,255,66,66,36,36
,24,0,24,24,0,0,0
10360 DATA 255,24,0,189,129,189,1
29,153,24,24,24,0,0,0,0,0,110,60,
66,126,126,66,0,60
10370 DATA 24,0,0,0,0,0,0,0,254,1
6,68,56,124,198,198,124,56,0,0,0,
0,0,0,0
10380 DATA 255,0,60,153,255,153,0
,255,0,0,0,0,0,0,0,60,24,0,189,
129,189,129,153

10390 DATA 24,24,24,0,0,0,0,0,118
,60,0,126,126,0,0,60,24,0,0,0,0,
0,0
10400 DATA 56,16,68,56,124,198,19
8,124,56,0,0,0,0,0,0,24,0,60,15
3,255,153,0,24
10410 DATA 0,0,0,0,0,0,0,3,12,48,
192,0,0,0,0,0,0,0,0,0,0,0,0
10420 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,112,112,240,66,64,188,1
30,130
10430 DATA 130,130,130,130,130,13
0,130,130,130,130,130,130,130,130
,130,130,130,130,130,130,130,65,0
,100
10440 DATA 0,72,138,72,238,32,100
,174,32,100,189,67,100,141,10,212
,141,24,208,141,26,208,224,24
10450 DATA 208,5,169,0,141,32,100
,104,170,104,64,125,122,120,118,1
16,114,112,112,112,112,112,112,11
2
10460 DATA 112,112,112,112,112,11
2,112,112,112,112,112,112,0,0,0,0
,0,0,0,0,0,0,0,0
10470 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10480 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10490 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10500 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10510 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10520 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10530 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10540 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10550 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10560 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10570 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10580 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10590 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10600 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10610 DATA 0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0
10620 DATA 0,0,0,0,0,0,0,0,0,0,0,

Basic Listing (cont'd)

0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10630 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10640 DATA 112,112,240,66,0,0,130
 ,130,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0
 10650 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10660 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10670 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10680 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10690 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10700 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10710 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10720 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10730 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10740 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10750 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10760 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10770 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10780 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10790 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
 10800 DATA 0,0,0,0,0
 20000 DATA 0,0,0,0,0,0,0,0,56,56,
 56,56,24,0,24,0,102,102,102,0,0,0
 ,0,0
 20010 DATA 102,255,102,102,255,10
 2,0,0,24,62,96,60,6,124,24,0,0,10
 2,108,24,48,102,70,0
 20020 DATA 28,54,28,56,111,102,59
 ,0,24,24,24,0,0,0,0,0,30,24,24,56
 ,56,56,62,0
 20030 DATA 120,24,24,28,28,28,124
 ,0,0,102,60,255,60,102,0,0,0,24,2
 4,126,24,24,0,0
 20040 DATA 0,0,0,0,0,24,24,48,0,0
 ,0,126,0,0,0,0,0,0,0,0,0,24,24,0

 20050 DATA 3,6,12,24,48,96,64,0,1
 27,99,99,99,99,99,127,0,56,24,24,
 24,62,62,62,0
 20060 DATA 127,3,3,127,96,96,127,

0,126,6,6,127,7,7,127,0,112,112,1
 12,119,119,127,7,0
 20070 DATA 127,96,96,127,7,7,127,
 0,124,108,96,127,99,99,127,0,127,
 3,3,31,24,24,24,0
 20080 DATA 62,54,54,127,119,119,1
 27,0,127,99,99,127,7,7,7,0,0,24,2
 4,0,24,24,0,0
 20090 DATA 0,24,24,0,24,24,48,0,6
 ,12,24,48,24,12,6,0,0,126,0,0,126
 ,0,0,0
 20100 DATA 96,48,24,12,24,48,96,0
 ,127,99,3,31,28,0,28,0,127,99,111
 ,111,111,96,127,0
 20110 DATA 63,51,51,127,115,115,1
 15,0,126,102,102,127,103,103,127,
 0,127,103,103,96,99,99,127,0
 20120 DATA 126,102,102,119,119,11
 9,127,0,127,96,96,127,112,112,127
 ,0,127,96,96,127,112,112,112,0
 20130 DATA 127,99,96,111,103,103,
 127,0,115,115,115,127,115,115,115
 ,0,24,24,24,24,24,24,24,24
 20140 DATA 12,12,12,14,14,110,126
 ,0,102,102,108,127,103,103,103,0,
 48,48,48,112,112,112,126,0
 20150 DATA 103,127,127,119,103,10
 3,103,0,103,119,127,111,103,103,1
 03,0,127,99,99,103,103,103,127,0

 20160 DATA 127,99,99,127,112,112,
 112,0,127,99,99,103,103,103,127,7
 ,126,102,102,127,119,119,119,0
 20170 DATA 127,96,127,3,115,115,1
 27,0,127,28,28,28,28,28,28,0,103,
 103,103,103,103,103,127,0
 20180 DATA 103,103,103,103,111,62
 ,28,0,103,103,103,111,127,127,103
 ,0,115,115,115,62,103,103,103,0
 20190 DATA 103,103,103,127,28,28,
 28,0,127,102,108,24,55,103,127,0,
 30,24,24,24,24,24,30,0
 20200 DATA 64,96,48,24,12,6,3,0,1
 20,24,24,24,24,24,120,0,0,8,28,54
 ,99,0,0,0
 20210 DATA 0,0,0,0,0,0,255,0,0,54
 ,127,127,62,28,8,0,56,124,254,247
 ,243,255,218,207
 20220 DATA 0,0,96,240,252,254,126
 ,255,127,247,121,127,63,28,0,0,22
 3,191,255,252,48,0,0,0
 20230 DATA 0,22,62,127,60,0,0,0,0
 ,0,0,0,0,0,48,120,1,7,15,7,0,0,0,
 0
 20240 DATA 240,176,96,128,0,0,0,0
 ,0,254,254,198,198,198,254,254,12

Basic Listing (cont'd)

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8,192,224,240,248,252,254,255
20250 DATA 15,15,15,15,0,0,0,0,24
0,240,240,240,0,0,0,0,255,255,0,0
,0,0,0,0
20260 DATA 0,0,0,0,0,0,255,255,0,
0,0,0,240,240,240,240,0,28,28,119
,119,8,28,0
20270 DATA 0,0,0,31,31,24,24,24,0
,0,0,255,255,0,0,0,24,24,24,255,2
55,24,24,24
20280 DATA 0,0,60,126,126,126,60,
0,0,0,0,0,255,255,255,255,192,192
,192,192,192,192,192,192
20290 DATA 0,0,0,255,255,24,24,24
,24,24,24,255,255,0,0,0,240,240,2
40,240,240,240,240,240
20300 DATA 24,24,24,31,31,0,0,0,1
20,96,120,96,126,24,30,0,0,24,60,
126,24,24,24,0
20310 DATA 0,24,24,24,126,60,24,0
,0,24,48,126,48,24,0,0,0,24,12,12
6,12,24,0,0
20320 DATA 0,24,60,126,126,60,24,
0,0,0,63,3,127,103,127,0,0,96,96,
127,115,115,127,0
20330 DATA 0,0,127,96,96,96,127,0
,0,3,3,127,103,103,127,0,0,0,127,
99,127,112,127,0
20340 DATA 0,30,24,126,24,56,56,0
,0,0,127,99,99,127,7,127,0,96,96,
127,115,115,115,0
20350 DATA 0,12,0,12,12,28,28,0,0
,12,0,12,12,14,14,126,0,48,48,118
,124,118,115,0
20360 DATA 0,24,24,24,56,56,56,0,
0,0,102,127,127,107,99,0,0,0,63,5
1,115,115,115,0
20370 DATA 0,0,63,51,115,115,127,
0,0,0,63,51,115,127,112,112,0,0,1
27,99,99,127,7,7
20380 DATA 0,0,63,51,112,112,112,
0,0,0,127,96,127,7,127,0,0,12,127
,12,28,28,28,0
20390 DATA 0,0,51,51,115,115,127,
0,0,0,99,99,99,54,28,0,0,0,99,107
,127,62,54,0
20400 DATA 0,0,102,60,24,60,102,0
,0,0,51,51,115,127,3,15,0,0,126,1
2,24,48,126,0
20410 DATA 0,24,60,126,126,24,60,
0,24,24,24,24,24,24,24,0,126,1
20,124,110,102,6,0
20420 DATA 8,24,56,120,56,24,8,0,
16,24,28,30,28,24,16,0,2

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0 REM * CHECK DATA *
1 DATA 7304,285,24,667,649,857,14
9,893,529,533,285,645,573,111,336
,216,367,185
90 DATA 9168,420,73,693,286,951,7
0,826,415,904,924,237,538,891,194
,896,102,748
2010 DATA 10928,878,564,503,464,4
63,736,929,67,954,527,684,730,480
,847,806,679,617
10070 DATA 10689,689,640,635,694,
485,398,668,668,542,549,653,976,7
55,517,587,533,700
10240 DATA 8558,803,573,729,491,5
94,543,488,686,955,75,440,273,324
,746,162,558,118
10410 DATA 12064,133,645,169,861,
70,116,917,918,919,911,912,913,91
4,915,916,917,918
10580 DATA 15141,919,920,912,913,
914,915,478,917,918,919,920,921,9
13,914,915,916,917
10750 DATA 8926,918,919,920,921,9
22,166,548,382,955,129,292,138,33
3,313,92,684,294
20110 DATA 12646,811,922,707,668,
988,939,665,905,497,861,212,520,4
08,916,754,935,938
20280 DATA 4806,636,490,85,934,25
4,216,294,86,156,218,99,41,20,280
,997

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Assembler Listing

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00010 .LI OFF
00020 *****
00030 * SKY WARRIOR *
00040 * BY JACK CHUNG *
00050 * FOR ATARI WITH *
00060 * 48 K *
00070 *****
00080 ;
00090 ;
00100 ;
00110 ;
00120 VERTI .EQ $200
00130 DMACTL .EQ $22F
00140 DLST .EQ $230
00150 GRCTL .EQ $D01D
00160 PMBASE .EQ $D407
00170 COLPMO .EQ $02C0
00180 HPOSP0 .EQ $D000
00190 STICK .EQ $0278
00200 TRIGO .EQ $D010

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Assembler Listing (cont'd)

00210	NMIEN	.EQ \$D40E	00770	STA COLPM0
00220	PRIOR	.EQ \$026F	00780	LDA #\$34
00230	SOUND	.EQ \$D200	00790	STA COLPM0+1
00240	SCREEN	.EQ 560	00800	LDA #\$54
00250	LDM	.EQ \$82	00810	STA COLPM0+2
00260	JVB	.EQ \$41	00820	LDA #\$84
00270	WSYNC	.EQ \$D40A	00830	STA COLPM0+3
00280			00840	MAIN LDA #\$00
00290	ADR	.EQ \$80	00850	STA SPRITE
00300			00860	LDA #\$74
00310		.OR \$6000	00870	STA SPRITE+1
00320	RIGHT	.EQ \$8	00880	OK LDY MAN
00330	LEFT	.EQ \$4	00890	LDA PHIT,Y
00340	DOWN	.EQ \$2	00900	BEQ OK1
00350	UP	.EQ \$1	00910	JSR KILL
00360	HSPEED	.EQ 4	00920	JMP TT
00370	VSPEED	.EQ 4	00930	OK1 JSR RSTICK
00380			00940	LDY MAN
00390	PLAYER	.EQ \$7000	00950	LDA MY,Y
00400	SPRITE	.EQ \$CC	00960	CLC
00410			00970	ADC #1
00420	START	PLA	00980	STA MY,Y
00430		LDA #DSP	00990	LDA OY,Y
00440		STA 560	01000	CLC
00450		LDA /DSP	01010	ADC #1
00460		STA 561	01020	STA OY,Y
00470		LDA 88	01030	JSR MOVE
00480		STA DSP+4	01040	LDY MAN
00490		LDA 89	01050	LDA MISSLEON,Y
00500		STA DSP+5	01060	BEQ TT
00510		LDA #\$3A	01070	JSR MDRAW
00520		STA DMACTL	01080	JSR MISSLE
00530		LDA #\$03	01090	JSR HIT
00540		STA GRACLT	01091	LDA JUMPOUT
00550		LDA /PLAYER	01092	BEQ TT
00560		STA PMBASE	01100	LDY MAN
00570		LDA #1	01101	STY TEMP1
00580		STA PRIOR	01102	LDA #0
00590		LDA #\$C0	01103	STA JUMPOUT
00600		STA NMIEN	01104	RTS
00610		LDA #DLI	01110	TTT PLA
00620		STA 512	01120	TT INC MAN
00630		LDA /DLI	01130	INC SPRITE+1
00640		STA 513	01140	LDA MAN
00650		LDY #0	01150	CMP #4
00660		TYA	01160	BCC OK
00670	.1	STA PLAYER+\$400,Y	01170	LDA #0
00680		STA PLAYER+\$500,Y	01180	STA MAN
00690		STA PLAYER+\$600,Y	01190	JSR DELAY
00700		STA PLAYER+\$700,Y	01200	LDX SH
00710		STA PLAYER+\$300,Y	01210	CPX #64
00720		INY	01220	BNE .11
00730		BNE .1	01230	LDX #0
00740		LDA #\$00	01240	STX SH
00750		STA \$2C6	01250	LDX #10
00760		LDA #\$74	01260	STX SOUND

Assembler Listing (cont'd)

01270		LDX #\$84	01830		STA MY,Y
01280		STX SOUND+1	01840		LDA 632,Y
01290		JMP MO1	01850		CMP #15
01300	.11	LDX #64	01860		BEQ FINI
01310		STX SH	01870		CMP #14
01320		LDX #0	01880		BNE A1
01330		STX SOUND	01890		LDA #1
01340		LDX #10	01900		STA DIR,Y
01350		STX SOUND+1	01910		JMP FINI
01360	MO1	JMP MAIN	01920	;	
01370			01930	A1	CMP #13
01380	RSTICK	LDY MAN	01940		BNE A2
01390		LDA STICK,Y	01950		LDA #2
01400		TAX	01960		STA DIR,Y
01410		TXA	01970		JMP FINI
01420		AND #UP	01980	;	
01430		BNE .1	01990	A2	CMP #7
01440		LDA OY,Y	02000		BNE A3
01450		SEC	02010		LDA #4
01460		SBC #2	02020		STA DIR,Y
01470		STA OY,Y	02030		JMP FINI
01480		JMP .1	02040	;	
01490		TXA	02050	A3	CMP #11
01500		AND #DOWN	02060		BNE FINI1
01510		BNE .1	02070		LDA #3
01520		LDA OY,Y	02080		STA DIR,Y
01530		CLC	02090		JMP FINI
01540		ADC #1	02100	FINI	RTS
01550		STA OY,Y	02110	;	
01560	.1	TXA	02120	;	
01570		AND #LEFT	02130	;	
01580		BNE .3	02140	;	
01590		LDA OX,Y	02150	FINI1	LDA #0
01600		SEC	02160		STA DIR,Y
01610		SBC #1	02170		STA MISSLEON,Y
01620		STA OX,Y	02180		RTS
01630	.3	TXA	02190	;	
01640		AND #RIGHT	02200	;	
01650		BNE .4	02210	;	
01660		LDA OX,Y	02220	;	
01670		CLC	02230	;	
01680		ADC #1	02240	MOVE	LDY MAN
01690		STA OX,Y	02250		LDA OX,Y
01700	.4	LDA MISSLEON,Y	02260		STA HPOSP0,Y
01710		BNE FINI	02270		LDY MAN
01720		LDA 644,Y	02280		TYA
01730		BNE FINI	02290		ASL ;*2
01740		LDA #1	02300		ASL ;*4
01750		STA MISSLEON,Y	02310		ASL ;*8
01760		LDA OX,Y	02320		ASL ;*16
01770		CLC	02330		CLC
01780		ADC #3	02340		ADC SH
01790		STA MX,Y	02350		TAX
01800		LDA OY,Y	02360		LDA OY,Y
01810		CLC	02370		TAY
01820		ADC #4	02380	MO0	LDA SHAPE,X

Assembler Listing (cont'd)

02390	STA (SPRITE),Y	02950	BCC .4
02400	INY	02960	JMP FINISH
02410	INX	02970 .4	RTS
02420	INC COUNT	02980 ;	
02430	LDA COUNT	02990 ;	
02440	CMP #16	03000 MDRAW	LDY MAN
02450	BCC MOO	03010	LDA #1
02460	LDA #0	03020	STA 53279
02470	STA COUNT	03030	LDA MX,Y
02480	RTS	03040	STA \$D004,Y
02490 ;		03050	LDX MAN
02500 ;		03060	LDA MY,Y
02510 ;		03070	TAY
02520 ;		03080	LDA #0
02530 ;		03090	DEY
02540 MISSLE	LDY MAN	03100	STA PLAYER+\$300,Y
02550	LDA MX,Y	03110	INY
02560	STA SOUND+4	03120	LDA MSHAPE,X
02570	LDA #\$88	03130	STA PLAYER+\$300,Y
02580	STA SOUND+5	03140	INY
02590	LDA DIR,Y	03150	STA PLAYER+\$300,Y
02600	TAX	03160	INY
02610	CPX #1	03170	LDA #0
02620	BNE .1	03180	STA PLAYER+\$300,Y
02630	LDA MY,Y	03190	RTS
02640	SEC	03200 ;	
02650	SBC #VSPEED	03210 ;	
02660	STA MY,Y	03220 ;	
02670	CMP #30	03230 FINISH	LDA #0
02680	BCS .1	03240	STA MISSLEON,Y
02690	JMP FINISH	03250	STA SOUND+4
02700 .1	CPX #2	03260	STA SOUND+5
02710	BNE .2	03270	LDA #0
02720	LDA MY,Y	03280 CLEAN	STA PLAYER+\$300,Y
02730	CLC	03290	INY
02740	ADC #VSPEED	03300	BNE CLEAN
02750	STA MY,Y	03310	RTS
02760	CMP #230	03320 ;	
02770	BCC .2	03330 ;	
02780	JMP FINISH	03340 HIT	LDY MAN
02790 .2	CPX #3	03350	LDA 53256,Y
02800	BNE .3	03360	BEQ RETURN
02810	LDA MX,Y	03370	STA TEMP
02820	SEC	03380	LDA #1
02830	SBC #HSPEED	03390	STA 53278
02840	STA MX,Y	03400	LDA TEMP
02850	CMP #40	03410	AND #1
02860	BCS .3	03420	CMP #1
02870	JMP FINISH	03430	BNE B1
02880 .3	CPX #4	03440	LDA #0
02890	BNE .4	03450	CMP MAN
02900	LDA MX,Y	03460	BEQ RETURN
02910	CLC	03470	LDA #1
02920	ADC #HSPEED	03480	STA PHIT
02930	STA MX,Y	03481	STA JUMPOUT
02940	CMP #200	03490	RTS

Assembler Listing (cont'd)

03500 ;			04030	BCC SKIP
03510 B1	LDA TEMP		04040	LDA #0
03520	AND #2		04050	STA PHIT,Y
03530	CMP #2		04060	STA SOUND+2
03540	BNE B2		04070	STA SOUND+3
03550	LDA #1		04080 SKIP	RTS
03560	CMP MAN		04090 ;	
03570	BEQ RETURN		04100 ;	
03580	LDA #1		04110 DELAY	LDA #0
03590	STA PHIT+1		04120	STA 20
03591	STA JUMPOUT		04130 .1	LDA 20
03600	RTS		04140	CMP #2
03610 ;			04150	BCC .1
03620 B2	LDA TEMP		04160	RTS
03630	AND #4		04170 ;	
03640	CMP #4		04180 PHIT	.DA #0,#0,#0,#0
03650	BNE B3		04181 JUMPOUT	.DA #0
03660	LDA #2		04190 SH	.DA #0
03670	CMP MAN		04200 TEMP	.DA #0
03680	BEQ RETURN		04201 TEMP1	.EQ \$600
03690	LDA #1		04210 COUNT	.DA #0
03700	STA PHIT+2		04220 MX	.DA #0,#0,#0,#0
03705	STA JUMPOUT		04230 MY	.DA #0,#0,#0,#0
03710	RTS		04240 MDIR	.DA #1,#2,#3,#4
03720 ;			04250 DIR	.DA #0,#0,#0,#0
03730 B3	LDA TEMP		04260 MISSLEON	.DA #0,#0,#0,#0
03740	AND #8		04270 OX	.DA #112,#120,#130
03750	CMP #8		,#140	
03760	BNE RETURN		04280 OY	.DA #100,#110,#120
03770	LDA #3		,#140	
03780	CMP MAN		04290 FRAME	.HS 00
03790	BEQ RETURN		04300 MAN	.DA #0
03800	LDA #1		04310 ;	
03810	STA PHIT+3		04320 DSHAPE	
03811	STA JUMPOUT		04330 .DA #0,#60,#86,#171,#213,#	
03820 RETURN	RTS		255,#66,#66,#36,#36,#24,#0,#24,#2	
03830 ;			4,#0,#0	
03840 KILL	LDY MAN		04340 SHAPE	
03850	LDA #\$A8		04350 .DA #0,#255,#24,#0,#189,#1	
03860	STA SOUND+3		29,#189,#129,#153,#24,#24,#24,#0,	
03870	LDA OY,Y		#0,#0,#0	
03880	CLC		04360 .DA #0,#110,#60,#66,#126,#	
03890	ADC #1		126,#66,#0,#60,#24,#0,#0,#0,#0	
03900	STA OY,Y		,#0	
03910	STA SOUND+2		04370 .DA #0,#254,#16,#68,#56,#1	
03920	TAY		24,#198,#198,#124,#56,#0,#0,#0,#0	
03930	LDX #0		,#0,#0	
03940 L1	LDA DSHAPE,X		04380 .DA #0,#255,#0,#60,#153,#2	
03950	STA (SPRITE),Y		55,#153,#0,#255,#0,#0,#0,#0,#0	
03960	INY		,#0	
03970	INX		04390 .DA #0,#60,#24,#0,#189,#12	
03980	CPX #16		9,#189,#129,#153,#24,#24,#24,#0,	
03990	BCC L1		0,#0,#0	
04000	LDY MAN		04400 .DA #0,#118,#60,#0,#126,#1	
04010	LDA OY,Y		26,#0,#0,#60,#24,#0,#0,#0,#0,#0	
04020	CMP #250		0	

Assembler Listing (cont'd)

```

04410 .DA #0,#56,#16,#68,#56,#12
4,#198,#198,#124,#56,#0,#0,#0,#0,
#0,#0
04420 .DA #0,#24,#0,#60,#153,#25
5,#153,#0,#24,#0,#0,#0,#0,#0,#0,
0
04430 MSHAPE .DA #3,#12,#48,#192

04431 .OR $6400
04440 DSP .HS 7070F0
04450 .DA #$42
04460 .DA #0
04470 .DA #0
04480 .DA #LDM 1
04490 .DA #LDM 2
04500 .DA #LDM 3
04510 .DA #LDM 4
04520 .DA #LDM 5
04530 .DA #LDM 6
04540 .DA #LDM 7
04550 .DA #LDM 8
04560 .DA #LDM 9
04570 .DA #LDM 10

04580 .DA #LDM 11
04590 .DA #LDM 12
04600 .DA #LDM 13
04610 .DA #LDM 14
04620 .DA #LDM 15
04630 .DA #LDM 16
04640 .DA #LDM 17
04650 .DA #LDM 18
04660 .DA #LDM 19
04670 .DA #LDM 20
04680 .DA #LDM 21
04690 .DA #LDM 22
04700 .DA #LDM 23

04710 .DA #JVB
04720 .DA DSP
04730 COUNTR .DA #0
04740 DLI
04750 PHA
04760 TXA

```

```

04770 PHA
04780 INC COUNTR
04790 LDX COUNTR
04800 LDA COLBAK,X
04810 STA WSYNC
04820 STA $D018
04830 STA $D01A
04840 CPX #24
04850 BNE ENDDLI
04860 LDA #$00
04870 STA COUNTR
04880 ENDDLI PLA
04890 TAX
04900 PLA
04910 RTI
04920 COLBAK .DA #$7D,$$7A,$$78
,$$76,$$74,$$72,$$70
04930 .DA #$70,$$70,$$70
,$$70,$$70,$$70,$$70,$$70,$$70
04940 .DA #$70,$$70,$$70
,$$70,$$70,$$70,$$70,$$70,$$70

```

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PROGRAM CHECKER

by Bob Cockroft

Are you tired of spending much time copying in ROM programs, only to discover that you have made a number of typing errors? Well, your problems are over! PROGRAM CHECKER is a utility that will locate your errors.

The program's mechanics are simple. First, type-in and SAVE the PROGRAM CHECKER. Second, create an untokenized file of the program you want to check. This is done by LISTing the filename to the disk.

LIST "D:FILENAME"

Make certain that the program to be corrected has no gross errors such as missing lines. Now, LOAD and RUN the PROGRAM CHECKER. A new screen will immediately appear. It will ask for the filename of the program you want to check. Type-in the desired disk number and filename.

CHECK WHAT FILE:? D:FILENAME

Soon after pressing the RETURN key the screen will go blank and the disk drive will be turned-on. The PROGRAM CHECKER is now examining your program. Each line is given an identification number. These numbers are stored in an array so that they can later be displayed. The longer your program is, the longer this process will take.

After several seconds a new screen will appear. It will ask you which technique you wish to use to display the DATA output. Three options are given: the Screen(S), the Printer(P) or the Program(R). The first option, the screen, is best for short programs. This technique uses the screen to display the DATA. Unfortunately, longer programs may have more data statements that can be displayed on the screen at one time. This makes the Screen option useless for larger programs. The second option, the Printer(P), can be used for all programs. Unfortunately, this technique tends to waste paper and obviously would be unsuitable for those who do not have printers. This leaves us with the third and last option. The Program(P) option creates an untokenized file that contains the data statements. This technique can be used for any program. After pressing 'R' the disk drive will be turned-on. In a few seconds, after the Program Data has been cre-

ated, the READY prompt will appear. Erase the PROGRAM CHECKER, and ENTER and LIST the DATA program. In order to do this, type the following:

**NEW
ENTER 'D:D
LIST**

If you have done everything correctly, a series of data statements will appear on the screen.

Beginning with the sixth issue most programs in ROM will contain a separate group of data statements. These statements are called CHECK DATA. They represent the identification code for the program as it would be if it were correctly typed-in. Below is an example of this:

CHECK DATA

**10 DATA 4259,57,484,44,347,34
,3,567,44,33,4,55,334,6,356,245
,753,547,346
170 DATA 4549,45,5,8,456,56,3,6
,655,346,445,446,443,678,446,44
,7,456,4
330 DATA 1011,556,355,34,66**

You may have noticed that the first unit of data in each line is larger than the rest. The reason is that this value represents the summation of all the values in the line. The rest of the data numbers represent individual lines of the program you are checking. To aid identification, the data displays the lines in numerical order. This means that the second data number in each line represents the program line that corresponds to the data line. For example, the '57' in DATA line 10, represents line 10 in your program, whereas the neighboring '484' represents the first line that follows line 10 in your program. (Perhaps line 20) The '44' represents the second line that follows program line 10. (Perhaps line 30) In this way, any line in a program can be identified by its data position.

No matter which one of the three output options one chooses (Screen, Printer or Program), the PRO-

Continued on Page 31

GRAM CHECKER will produce a series of Data statements similar to, if not the same as the ones in the corresponding CHECK DATA. The Program Data below is the identification code that is produced by the PROGRAM CHECKER for the program you typed-in. Any errors in typing would be contained in this data. The CHECK DATA is really the Program Data as it would be without any errors. Therefore, by comparing the potentially error filled Program Data with correct CHECK DATA, any errors would be made visible. If the Program Data differs in any way from the ideal CHECK DATA, your program contains an error.

Program Data

```
10 DATA 4259,57,484,44,347,34
,3,567,44,33,4,55,334,6,356,245
,753,547,346
170 DATA 4545,45,5,4,456,56,3,6
,655,346,445,446,443,678,446,44
,7,456,4
330 DATA 1011,556,355,34,66
```

Compare the first unit of data in each line of the CHECK DATA with its corresponding value in the Program Data. If the values are the same, every program line that is represented in that data line is correct. If the two values are different, one or more lines in your program are incorrect. For example, examine line 170 in both the CHECK and the Program Data. Because the summation numbers in the CHECK DATA and Program data do not correspond, an error exists. Further examination will reveal that the fourth data numbers do not correspond with each other. Because the Program data does not match with the CHECK DATA, an error exists. In order to determine the program line that contains the error, the first data number, the summation(4545), must be disregarded. The next value '45' represents the program line 170, the value that corresponds to the data line. The following value '5' represents the line in your program that comes after line 170. This could be line 180 or any other line that immediately follows line 170. Finally, the next value is the one that contains the error. Because the error lies two numbers past the value that represents line 170, the program line that contains the error lies two lines after 170. ReLOAD the program you have been checking, and correct this line. Continue examining the remaining numbers in both the CHECK and Program Data for further errors.

Once you have learned how to use the program checker, it will become quick and easy to use. Although other magazines have programs to check for

errors, ROM CHECK DATA is compatible to the PROGRAM CHECKER only.

```
110 GRAPHICS 0
112 ? :? "          PROGRAM CHECK
ER":?
115 ? "    The screen will go blan
k after          entering the F
ILENAME":? :?
120 DIM PR$(14)
130 CLOSE #1:? "CHECK WHAT FILENA
ME";:INPUT PR$
140 P559=PEEK(559)
145 POKE 559,0
150 LINE=0:G=0:N=0
160 TRAP 130:OPEN #1,4,0,PR$
170 DIM K$(5),A$(126)
180 TRAP 200:INPUT #1,A$:LT=LT+1

190 GOTO 180
200 CLOSE #1:Q=INT(LT/17):DIM C(L
T),R(Q),SP$(15)
210 OPEN #1,4,0,PR$:GOTO 220
220 FOR J=1 TO 5:K$(J)=" ":NEXT J

230 N=0
240 INPUT #1;A$:N=N+1:U=1
250 IF A$(U,U)<>" " THEN K$(U)=A$
(U):U=U+1:GOTO 250
260 LINE=VAL(K$)
270 R(G)=LINE:G=G+1
280 TRAP 310:INPUT #1;A$
290 N=N+1:IF N=17 THEN N=0:GOTO 2
40
300 GOTO 280
310 CLOSE #1:OPEN #1,4,0,PR$
320 FOR I=1 TO LT:SM=0
330 GET #1,WT:SM=SM+WT
340 IF WT=155 THEN 360
350 GOTO 330
360 SM=SM-1000*INT(SM/1000)
370 C(I)=SM:X=2
380 NEXT I
390 CLOSE #1:M=0:LINE=R(0)
400 GRAPHICS 0
405 POKE 559,P559
410 ? :? "Screen(S) or Printer(P)
or Program(R) output?":INPUT SP$
:? :?
420 IF SP$="R" THEN OPEN #1,8,0,"
D:D"
430 TRAP 410
440 ST=0:N=17
450 IF LT<17 THEN N=LT
460 IF SP$="P" THEN 510
```

Continued on Page 31



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by Peter Ellison

This column, which was started in issue 3, is written for the person, who is considering buying a computer. Or for one who has just bought an ATARI and wants to know what reasons he or she bought it for? In the third issue I wrote how unlike its' competition, the Commodore 64(tm), was able to access excellent graphics through BASIC. Then in the fourth issue I discussed how one should go about buying his or her first home computer. Then in the last issue I commented on all the support ATARI has. Firstly, from its' manufacturers; Warner Communication, and then the numerous User Groups, BBS's, magazines, and third party software houses.

In this issue I'm going to discuss a very important reason why many people buy a computer, that is Business. Many being unfamiliar with computers, think of the Atari as just a game machine. Because Atari was first to come out with a game machine(2600), which took the nation by storm, many think of it as being nothing more than just that. The reality is, however, that Atari has the same basic structure as the Apple II and the Commodore 64(6502 microprocessor chip). In this issue I'm going to discuss some of the business and word processor software available for the Atari.

Last year one thing that really depressed Atari's sales was the lack of business software. I think this is all changing. One program that has made a strong impact on the computer world is VISICALC, a program that has been described as 'The program worth buying a computer for'. This program is finally available for the Atari and is a must for anyone who wants speed in keeping books. Any problem that can be solved by using a calculator or pen and paper can be done by Visicalc better and much, much faster. Another excellent piece of business software that Atari has produced is 'The Book Keeper'. This program allows a person to keep a general ledger, accounts receivable, accounts payable, and payroll. This program can make book keeping for any business

a snap.

One excellent Payroll program put out by a third party software company is called 'Miles Payroll System'. This program from Mile's Computing will keep track of up to 50 employees, allowing weekly, biweekly, semimonthly, or monthly pay periods. It accomodates regular, overtime, doubletime, sicktime, holiday, vacation, bonus, and commission earning categories. For a big or small business, this program has the flexibililty and ease of use that would save money on secretarial costs alone. Another third party vendor of Atari software called Continental software has a whole new line of business software available for the Atari. Though these programs were previously only available for the Apple II, they have now been converted to run on the Atari. They include The Home Accountant and The Tax Advantage. More program conversions are expected to be released in the next year.

Other good business related software is 'The Money Processor' from Luck Software, 'Financial Wizard' from Computari, 'Personal Finance System' from Dynacomp, 'Home Inventory' from Creative Software, and a whole lot more that can be found by just looking around. Below is a list of the different company names mentioned, and their addresses:

Atari, Inc.
P.O. BOX 50047
San Jose, CA 95150
(716)425-2833

Miles Computing
7136 Haskell Avenue, #204
Van Nuys, CA 91406
(203)994-6279

Continental Software
11223 S. Hindry Avenue
Los Angeles, CA 90045
(213)410-3977

Luck Software
1160 Niblick Road
Paso Robles, CA 93446
(805)238-2585

Computari
9607 Athlone
Dallas, TX 75218

Dynacomp, Inc.
1427 Monroe Avenue
Rochester, NY 14618
(716)442-8960

Creative Computer Software
230 E. Carribean Drive
Sunnyvale, CA 94089
(408)745-1655

Another area in which Atari has strength, is its word processing department. The function of a word processor is, as its name indicates, to process words. That is, to organize them. A newspaper is an example of this. Wherein a bunch of words are so organized that they are evenly spaced and create a straight margin on either side of the page. One of the best of the available word processors is 'ATARIWRITER' from Atari. This 16K cartridge gives the user the ease of use, plus the convenience of a cartridge. This program, written by William Robinson, is an improvement over his earlier word processor (which I still enjoy) Text Wizard(Datasoft).

Other good word processors on the market include: 'Bank Street Writer' from Broderbund, 'Letter Perfect' from LJK Enterprises, 'Super Text' from Muse, and 'Letter Writer' from The Programmers Workshop. Each program is good and has their own particular. Two spelling checkers for word processors are 'Atspeller' from APX and Spell Wizard from Datasoft. The latter is the better of the two, because it has a special dictionary of up to 33,000 different words to check your spelling. Below is a list of the different word processor companies:

Datasoft, Inc.
9421 Winnetka Avenue
Chatsworth, CA 91311
(213)701-5161

Broderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903

(415)479-1170

LJK Enterprises, Inc.
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(314)962-1855

Muse Software
347 N. Charles Street
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(301)659-7212

The Programmer's Workshop
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Lakewood, CA 90712

I hope that after reading the above article you will have a fuller appreciation of the capabilities of this machine. Your Atari has the power, and all that is needed is the program. That is one thing the Atari has over the competition, ease of use. In the next issue I will be discussing education and "Atari goes camping".

Program Checker (cont'd)

```
470 IF SP$="R" THEN 540
480 PRINT LINE;" DATA ";
485 FOR Y=1 TO N:ST=ST+C(17*M+Y):
NEXT Y
486 PRINT ST;" , ";
490 FOR Y=1 TO N:PRINT C(17*M+Y);
:IF Y=N THEN ? " ":GOTO 494
492 ? " , ";
494 NEXT Y:GOTO 570
510 LPRINT LINE;" DATA ";
515 FOR Y=1 TO N:ST=ST+C(17*M+Y):
NEXT Y
517 LPRINT ST;" , ";
520 FOR Y=1 TO N:LPRINT C(17*M+Y)
;:IF Y=N THEN LPRINT " "
524 NEXT Y:GOTO 570
530 LPRINT ST:GOTO 570
540 PRINT #1;LINE;" DATA ";
545 FOR Y=1 TO N:ST=ST+C(17*M+Y):
NEXT Y
547 PRINT #1,ST;" , ";
550 FOR Y=1 TO N:DAT=C(17*M+Y):IF
Y=N THEN PRINT #1;DAT:GOTO 554
552 PRINT #1;DAT;" , ";
554 NEXT Y
570 LT=LT-17:M=M+1
580 IF LT<1 THEN 610
590 LINE=R(M)
600 GOTO 440
610 END
```

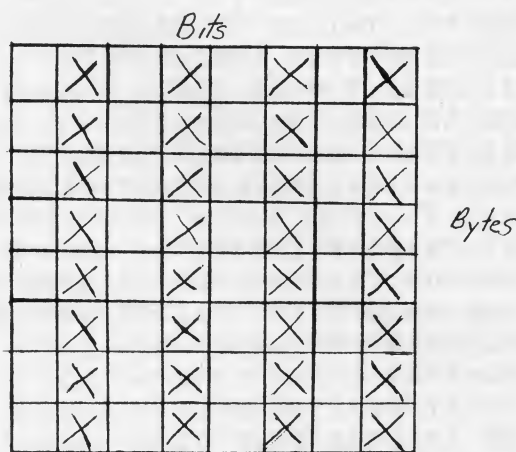
MULTICOLOURED CHARACTER GRAPHICS

by Bob Cockroft

It is assumed that the reader of this article has a basic knowledge of both GR.0 character graphics and Display Lists.

Although many people know how to use redefined character sets to improve graphic displays, many still do not know how to create multicoloured characters in (IR) mode 4 and 5 graphic screens. This is unfortunate in that many programs can be greatly improved with a little colour. As many as four colours can be drawn simultaneously on one character. There are two methods of doing this.

The first method, using the GR.0 characters, is simple. By creating a duplicate of the ROM character set in RAM and adjusting Character Base Register so that it points to that new set, one is able to modify the character by changing their bit map structure. In addition, colour character graphics give higher resolution and uses less memory than any of the high resolution graphic modes. (For a complete description of creating GR.0 character graphics refer to the article in ROM issue number 4 called 'Character Graphics Made Easy'). It is possible to get multicoloured characters by artifacting the GR.0 character set. By lighting up every other pixel in the character, a colour T.V. will draw a block of colour that is different from other characters which are not artifacted. By lighting up bits differently for each horizontal line, a number of blocks of colour can be created (see below)



The reason artifacting works for the GR.0 character set is that each pixel is the same size as the pixels in a GR.8 screen. As an result, any method of artifacting

in GR.8 will also work for characters in GR.0 However, this technique of creating multicoloured characters is not without some major disadvantages. Because artifacting (ploting every other pixel) needs to be done in order to get different colours, the horizontal resolution is reduced by one half. In addition, one is not able to control the colour the computer is to display by using the COLOR REGISTERS. The colour displayed in a refined GR.0 character set is determined primarily on the background colour. If you are one who does not mind these disadvantages, then GR.0 character sets are probably best for you. However, for those who want more, there is a better method of getting multicolours.

The second method artifacts two character sets that are multicoloured, high resolution and react to the values in the Color Registers. These sets are not widely known, probably due to the fact that they are not accessible through the BASIC command "GRAPHICS". They lie between and have many of the same characteristics of GR.0 and GR.1. The computer, every time a GRAPHICS command is made, produces a series of Instructions called the Display List. This list tells the Antic chip how to display screen data. Seen as a series of identical values, the Instruction Register (IR) numbers tell the Antic chip which graphic mode to present on the screen. Varying with the screen, each possible value of the (IR) mode numbers represents a different graphic mode. For example, the (IR) mode number for GR.0 is '2' where as the (IR) mode number for GR.1 on is '6'. Below is a program that presents the Display List of any graphic mode that can be called from BASIC. RUN the program and type-in the number of the graphic mode you want to examine. Remember that the series of identical numbers in the center of the list are the (IR) mode numbers for graphic mode for which you asked. Examine the (IR) mode numbers for the different graphic modes. Table 1 gives the 9 graphic modes and the corresponding (IR) mode number.

```
1 REM * PRINT DISPLAY LIST *
5 DIM DAT(200)
10 B = 175
12 GRAPHICS 0
14 ?:"Which graphic mode?"
17 INPUT A
```



```

20 GRAPHICS A
25 TRAP 20
30 DL = PEEK(560) + 256*PEEK(561)
40 C = 1
50 DAT(C) = PEEK(DL = -1):C = + 1
60 IF C < B + 1 THEN 50
70 GRAPHICS 0
80 L = 1
90 ? DAT(L);“ ”;
100 IF L > B THEN 130
110 L = L + 1
120 GOTO 90
130 GOTO 14

```

Table 1

GRAPHICS 'X'	(IR) mode number
0	2
	(IR) modes 3,4 and 5
1	6
2	7
3	8
4	9
5	10
6	11
7	13
8	15

The graphic modes between GR.0 and GR.1, in other words (IR) modes 3,4 and 5 are the ones we are interested in. Although they are not accessible from BASIC, they offer some unique opportunities for colour manipulation. (IR) mode 3 is nearly the same as GR.0 and as a result not overly useful for our purposes. However, (IR) mode 4 and 5, although somewhat different from one other, are both able to produce multicolours. (IR) mode 5 characters have the same horizontal length as GR.0 characters, but are twice as tall. As a result, any character that needs to be taller than normal characters should be created with this mode. On the other hand, (IR) mode 4 characters are the same size as GR.0 characters in all respects. This fact enables a screen to be easily created to have both the normal GR.0 characters and the modified and multicoloured (IR) mode 4 characters. This is important because a ROM character, as seen on an (IR) mode 4 screen, is nearly unreadable. As a result SCOREs or any other readable portions of games

should be written on GR.0,1 or 2 screens.

The first thing to do to make a multicoloured graphics mode is to create a graphics mode 0 screen.

1 GRAPHICS 0

Secondly, determine where the display list starts by examining the values in the Display List Pointers.

2 D = PEEK(560) + 256*PEEK(561)

Thirdly, add the value of the (IR) mode(4 or 5) you want to create to the LMS instruction.

3 POKE D + 3,64 + 4

Finally, change the (IR) mode number for GR.0 (2's) into the (IR) mode number for the wanted multicolour mode (4's or 5's)

4 FOR X = 6 TO 28:POKE D + 6 + X,4:NEXT X

If you are still confused, reread the four steps while examining the Display List below.

Graphics 0 Display List

D	12	These 3 values of '112'
D + 1	112	print a total of 24 blank
D + 2	112	lines on top of the screen
D + 3	66	LMS 64 + (IR) mode number for GR.0 2 = 66 For Antic mode 4 change this value to 68(64 = 4)
D + 4	64	These 2 values give the
D + 5	156	address of the first byte of data
D + 6	2	The '2's or (IR) mode lines represent horizontal lines of GR.0
D + 7	2	change the '2's into the (IR) mode number
D + 8	2	of the wanted (IR) mode
D + 9	2	For example, 4 or 5
D + 10	2	
D + 11	2	
D + 12	2	
D + 13	2	

D+14 2
D+15 2 **The higher the resolution of**
D+16 2 **the graphics mode, the more**
D+17 2 **(IR) mode number will there**
D+18 2 **be.**
D+19 2
D+20 2 **Each (IR) mode number represents**
D+21 2 **one horizontal line on the screen**
D+22 2 **called a scan line.**
D+23 2 **Higher resolution requires a large**
D+24 2 **number of scan lines to provide**
D+25 2 **detail**
D+26 2
D+27 2
D+28 65 **Jump and wait for vertical blank**
D+29 32 **The address of the**
D+30 156 **Display List**

There is no reason to change the last three bytes of the GR.0 display list when changing it to (IR) mode 4, because the width of both of their mode lines are identical. In other words, both GR.0 and (IR) mode 4 lines both use 8 scan lines each. However, because (IR) mode 5 lines are twice as tall, fewer mode lines are put on the screen. The result of this is that an (IR) mode 5 display list will be shorter. The values in the last three bytes which tell the computer to redraw the screen, will need to be moved to a new memory location. It is important that the total of all scan lines on the screen add up to 192. Each (IR) mode 5 line uses 16 scan lines. Therefore, not more than $(192 \div 6) = 32$ (IR) mode 5 lines can be placed on the screen at once.

(It may be helpful to refer to table 2 while reading the next paragraph)

The location for the colour you wish to display is determined by the placement of lit pixels. The 8 by 8 character block is divided into 4 columns of 2 pixels each. It is the arrangement of these 2 pixels that determines which COLOR REGISTER responds to these pixels position. When the right pixel is lit, COLOR REGISTER 0 controls the colour for the two pixels. When the left pixel is lit, COLOR REGISTER 1 controls the colour for the two pixels. When both pixels are lit, COLOR REGISTER 2 controls the colour for the two pixels. And when neither pixel is lit, the background color (COLOR REGISTER 4), controls the colour for the two pixels. It is important to note that it is also possible to have more than one colour on one horizontal line of a character. In fact, one can have as many as four. (refer to the last horizontal row in Table 2)

Bit Map							
/Col1 \	/Col2 \	/Col3 \	/Col4 \				
	X		X		X		X
X		X		X		X	
X	X	X	X	X	X	X	X
X		X		X	X	X	X
	X		X				
	X		X				
	X	X		X	X		

Table 2

Right Pixel = COLOR REGISTER 0

Left Pixel = COLOR REGISTER 1

Both Pixels = COLOR REGISTER 2

Neither Pixels = Background COLOR

Mix: left side = COLOR 1

:right side = COLOR 2

Mix: left side = COLOR 0

right side = background COLOR

Four colour on one horizontal line

Note: the first two pixels respond to COLOR 0, the second two respond to COLOR 1, the third two respond to COLOR 2: the last two respond to COLOR 2

It is difficult to create both the wanted character shape and the colour patterns. A good deal of experimentation is needed before most programmers get a redefined character that they are satisfied with. Because of this, I have made a multicolour character editor to go with this article. Although it does not have some extra features that many commercial editors do, it should be helpful in speeding up the character redefining process. The editor is quick and easy to use. After you have typed it in and RUN it, the program will immediately create a duplicate ROM character set in the RAM. In order to do this quickly, I used a short machine language subroutine. Next, use the joystick to change the hue of the colour square to a

shade you like. Press the START button in order to register your choice with the computer. Repeat this process for the 3 COLOR REGISTERS which the program allows you to change. The background COLOR is maintained a constant black so that the modified character is more distinctive. After this the screen will become dark and ask you to draw your character with the joystick in the enlarged character block. To erase, press the joystick button and move the cursor over the pixel you want clear. Press the START button when you want to see the modified character in real size. If you are satisfied with what you see, press the SELECT button to end the editing session. Otherwise, press OPTION and continue to draw with the joystick. Some brighter colour combinations may cause the instructions at the bottom of this screen to become unreadable. Just follow the written instructions above, or first experiment with darker colours and you should have no problems. After ending your editing session, the program will display a line of 8 numbers. These numbers are values that must be inserted into the character set in order to modify your character. In addition, the values for the COLOR REGISTER that you chose at the beginning of the program are displayed. With this information, you will be able to easily add this new character to your programs. Press the RESET button before restarting the editor to update the character pointers.

The second program is an example, of what can be done with character graphics. It creates a display depicting a colourful space scene. Multicoloured stars, spaceships and a station covered in graffiti are all possible with character graphics. This program uses all the same processes described in this article. All items have been created with the help of the character editor.

```

2 REM *   PROGRAM 1
3 REM *   MULTIPLE COLOUR
4 REM *
5 REM *   CHARACTER EDITOR
10 GRAPHICS 0
11 SETCOLOR 2,16,1
12 POKE 559,62
13 POKE 53248,120
15 T=PEEK(106)-16
16 POKE 54279,T
17 POKE 53277,3
18 BAS=T*256+1024
20 FOR X=150 TO 180:POKE BAS+X-1,
255:NEXT X
21 CR=0
22 POKE 752,1
24 POSITION 15,6:? "SETCOLOR ";CR

```

```

25 POSITION 3,9:? "Use joystick t
o determine value for
COLOR REGISTER ";CR
26 POSITION 8,12:? "Press START b
utton to end"
30 X=88
31 ST=STICK(0)
32 IF ST=14 THEN X=X+1
33 IF ST=13 THEN X=X-1
34 POSITION 12,16:? X;" "
35 IF X>255 THEN X=255
36 IF X<0 THEN X=0
37 POKE 704,X
38 IF PEEK(53279)<>6 THEN 31
40 CR=CR+1
42 IF CR=1 THEN X8=X
43 IF CR=2 THEN X9=X
44 IF CR=3 THEN X10=X
45 FOR Y=1 TO 75:NEXT Y
48 IF CR<3 THEN 24
50 POKE 752,0
60 DIM CH(8)
70 RT=PEEK(106)-4
80 NT=RT*256
90 POKE 106,PEEK(106)-5
99 REM * LOAD MACHINE CODE
100 FOR X=1 TO 31:READ D:POKE 153
5+X,D:NEXT X
108 REM * MOVE CHARACTER SET
110 X=USR(1536)
120 FOR X=1 TO 8:CH(X)=0:NEXT X
130 REM * EDIT SECTION
139 POKE 53248,0
140 GRAPHICS 4:COLOR 1:POKE 708,X
8:POKE 709,X9:POKE 710,X10:POKE 7
52,1
150 DL=PEEK(560)+256*PEEK(561)
160 XP=40:YP=13
165 REM * DRAW SHAPE
169 ? ,,"Z":? :? "Press START to
display character"
170 ST=STICK(0)
180 IF ST=14 AND YP>13 THEN YP=YP
-1
190 IF ST=13 AND YP<20 THEN YP=YP
+1
200 IF ST=7 AND XP<47 THEN XP=XP+
1
210 IF ST=11 AND XP>40 THEN XP=XP
-1
220 IF STRIG(0)=1 THEN COLOR 1:FO
R X=1 TO 5:NEXT X:GOTO 250
230 FOR X=1 TO 5:PLOT XP,YP:NEXT
X
240 COLOR 0
250 PLOT XP,YP

```



```

260 IF PEEK(53279)=6 THEN 280
270 GOTO 170
280 SB=PEEK(88)+256*PEEK(89)
282 POKE 708,X8
284 POKE 709,X9
286 POKE 710,X10
290 SBH=SB+135
300 FOR X=0 TO 7
310 CH(X+1)=PEEK(SBH+X*10)
320 POKE NT+464+X,CH(X+1)
330 NEXT X
340 POKE DL+45,68
350 POKE DL+48,4:POKE DL+49,2:POKE
DL+50,2
360 POKE 756,NT/256
370 POKE 752,1:? ,,"Z":? :? "OPTI
ON to draw/or/SELECT to continue"

```

```

380 IF PEEK(53279)=3 THEN 169
390 IF PEEK(53279)=5 THEN 410
400 GOTO 380
410 GRAPHICS 0
420 POKE 752,0
430 REM * PRINT OUT DATA
440 SET=NT+464
450 FOR W2=0 TO 7:POKE SET+W2,CH(
W2+1):NEXT W2
460 GRAPHICS 0:POSITION 2,5:? "Pr
ess the character you have modifi
ed"
470 ? :? "          Character data
below"
480 ? :POSITION 6,9:FOR X=1 TO 8

490 IF X=8 THEN ? CH(X):GOTO 520

500 ? CH(X);",,";
510 NEXT X
520 POKE 756,NT/256:?
521 ? :? "          COLOR REGISTE
RS"
522 ? :? "loc 708=";PEEK(708);"
loc 709=";PEEK(709);" loc 710=";
PEEK(710)
530 ? :? "Press the RESET button
before          reRUNning the edit
or or you will get bad data"
532 ? :? "Your modified character
: Z"
540 DATA 104,160,0,162,0,189,0,22
4,157,0,156,232,224,0,208,245,200
,238,7,6,238,10,6,192
550 DATA 5,208,232,96,0,0,0

```

```

1 REM * CHECK DATA *
2 DATA 8365,220,724,541,714,957,2
26,932,75,107,20,985,92,756,544,8
73,230,369
26 DATA 8709,629,547,26,488,490,5
97,444,227,915,752,738,383,386,42
8,587,199,873
60 DATA 7277,815,139,879,445,699,
901,938,20,50,528,33,435,843,55,3
80,39,78
180 DATA 7442,310,304,257,298,823
,364,800,70,790,837,766,25,29,63,
969,76,661
320 DATA 10816,609,776,119,623,24
7,821,796,788,835,9,922,663,999,9
79,650,866,114
490 DATA 4683,48,969,776,398,86,5
12,782,106,474,532

```

Assembler Listing

```

00010 .LI OFF          ;MOVE CHARACTE
R SET
00020 .OR $600
00030 .TA $2600
00040 .TF "D:AD4.OBJ"
00100 BEGIN PLA
00108 LDY #0
00110 L2 LDX #0
00120 L1 LDA $E000,X      ;OLD LOCA
TION
00130 STA $9C00,X        ;NEW LOCA
TION
00140 INX
00150 CPX #0
00160 BNE L1
00170 INY
00172 INC $607
00174 INC $60A
00180 CPY #5
00190 BNE L2
00200 RTS

```

```

5 REM * PROGRAM 2 *
10 REM * SPACE DISPLAY *
100 T=PEEK(106)-4
105 NT=T*256
110 POKE 106,PEEK(106)-5
120 GRAPHICS 0
130 POKE 708,40:POKE 709,202:POKE
710,148
140 FOR X=0 TO 1023:POKE NT+X,PEE

```

```

K(57344+X):NEXT X
150 FOR X1=1 TO 14
160 READ LOC
170 SET=NT+LOC*8
180 FOR X2=0 TO 7:READ D
190 POKE SET+X2,D
200 NEXT X2
210 NEXT X1
220 POKE 756,NT/256
230 SETCOLOR 2,16,1
240 POKE 752,1
300 POSITION 10,10:? "&";" ";"#";
"$";"/";"%"
305 POSITION 25,10:? ", ";"!";"*";
"*";"/";"/";"*";"*";"!";"_"
310 POSITION 29,9:? "/" ;"/":POSIT
ION 29,11:? "/" ;"/"
315 POSITION 29,8:? "*" ;"*"
320 POSITION 29,12:? "*" ;"*"
325 POSITION 29,7:? "!" ;"!"
330 POSITION 29,13:? "!" ;"!"
340 POSITION 29,11:? "/" ;"/"
350 POSITION 10,7:? "$":POSITION
15,14:? "$"
360 POSITION 15,4:? ", ";"!";" ";"
";"!";"_"
370 POSITION 35,4:? "$":POKE 5,20
:? "$"
375 POSITION 5,21:? " ":POSITION
5,20:? "+"
380 POSITION 5,5:? "(" :POSITION 1
3,12:? "("
385 POSITION 38,3:? "(" :POSITION
37,19:? "("
390 POSITION 18,18:? "(" :POSITION
2,20:? "("
395 POSITION 5,18:? ")" :POSITION
15,15:? ")" :POSITION 15,3:? ")" :P
OSITION 12,2:? ")"
400 POSITION 24,19:? ")" :POSITION
37,15:? ")" :POSITION 12,12:? ")"
:POSITION 15,18:? ")"
405 POSITION 5,10:? ")" :POSITION
4,8:? ")" :POSITION 30,3:? ")" :POS
ITION 28,4:? ")"
410 POSITION 18,10:? ")" :POSITION
27,18:? ")" :POSITION 31,20:? ")"
:POSITION 33,17:? ")"
415 POSITION 26,14:? ")" :POSITION
37,10:? ")"
420 POSITION 4,15:? "a":POSITION
32,22:? "a":POSITION 20,21:? "a":
POSITION 7,22:? "a"
425 POSITION 25,3:? "a"
460 GOTO 460

```

```

500 DATA 1,60,255,165,165,165,165
,255,60
520 DATA 3,165,165,165,165,255,25
5,255,255
530 DATA 4,129,129,129,165,189,16
5,129,129
540 DATA 5,0,128,208,213,213,213,
208,128
550 DATA 6,1,3,131,235,235,131,3,
1
560 DATA 7,170,170,170,255,255,25
5,85,85
570 DATA 8,21,32,80,136,104,16,32
,128
580 DATA 9,0,0,0,0,32,48,32,0
590 DATA 97,0,8,12,62,12,8,0,0
600 DATA 10,255,195,165,153,153,1
65,195,255
610 DATA 11,8,8,62,8,8,8,28,62
620 DATA 12,1,35,35,255,35,35,1,0

630 DATA 13,128,132,196,255,196,1
32,128,0
640 DATA 15,181,181,181,215,215,2
23,90,90

```

```

1 REM * CHECK DATA *
5 DATA 7189,298,622,99,843,486,7,
464,216,175,876,161,574,205,822,8
22,242,277
240 DATA 8611,923,321,25,56,640,6
79,622,663,690,676,288,304,635,63
7,707,691,54
400 DATA 7479,198,948,194,741,310
,519,840,191,303,311,175,867,205,
31,617,681,348
610 DATA 1994,696,822,240,236
37,707,691,54

```

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PRODUCT REVIEWS

SOLO FLIGHT

Reviewed By Geoff Corry
MicroProse
10616 Beaver Dam Road
Hunt Valley, MD 21030

Ring! Ring! You wake up in a daze, wondering where you are. Oh yes, in a motel unit outside Wichita, Kansas. Ring! Who could be calling at this ungodly hour? You grope for the phone and recognize the gravelly voice of your boss. He tells you to get out of the sack and get down to the airport. There's an important package that has to be delivered to Kansas City as soon as possible. There might even be a bonus in it if you can get it there quick enough. You hang up, find the phone book and call a cab. Later the cab drops you off at an old hanger at the corner of the field. You go inside and see that old monoplane that takes all your spare time and cash to keep airworthy.

That was a fictional buildup to the MicroProse program SOLO FLIGHT. Let's continue with how you would take it from there. After the program has booted, you see a title, and then use the OPTION key until MAIL PILOT, KANSAS is displayed. Now depending on your experience, you push SELECT for higher levels of play. If you are new at this, you should run a few sessions in the FLYING mode to get use to the controls and instruments. Now that you have SELECTed your level, push START and a map of Kansas is displayed showing 7 airports and 5 towns to help you get your bearings. There is a little white dot on the Wichita runway that is you. Push START again and now you can pick your destinations with OPTION. Let's keep with our story and say that you have a 250 lb. package for Kansas City. You can't get anywhere without gas, so push SELECT until you have enough fuel to handle emergencies, but not so much that would give you take-off difficulties. Press START again and your map is again displayed, so that you can prepare a flight plan. O.K., to get to Kansas City, use the main runway at Wichita, take off due north and turn East to a compass heading of 70 degrees. When you are due north of Greeley, turn back to a compass heading of 0 degrees and get into a landing configuration for Kansas City. You will also notice that you pass the runway of Emporia to the south-east, and this would be a good time to start your descent.

Push START again, and you can now see your

aircraft at the south end of the Wichita main runway. Push 9 on the keyboard for full throttle and away you go. The plane will lift off when the airspeed reaches 90 knots. Hit 'L' to retract your landing gear and move your joystick to the right until the aircraft assumes a gentle bank. Bring the stick back to neutral and watch the heading until it gets just short of 70, then move the stick to the left until you are straight and level again. Now check your altitude. When you get to 1500 feet, throttle back by pushing '5' on the keyboard. Push the stick forward until the rate of climb indicator reaches 0. Allow the the aircraft to slowly sink to 1000' when you should be just north of Greeley. Now left bank the aircraft until you assume a heading of 0 degrees. Using the joystick, line up with the main north-south runway at Kansas City. Throttle back to 4 and get the rate of climb indicator into a -3 reading. Check your I.L.S. indicator, when the runway detail starts to show, and using the joystick and adjusting the throttle, slow the aircraft down to the touch-down speed of about 60 knots. Once you have



come to a complete stop on the runway, the map is displayed, and your ground track from Wichita to Kansas City is shown in a dotted line. When you push START again, your score for flying and landing at a reasonable speed is shown and the prompt time of flight is added as bonus points.

Now lets describe some of the features of this interesting program. You have three areas that you can fly in; Kansas, Washington-Oregon, and Colorado. There are the two scenarios, FLYING to become experienced and MAIL PILOT, where points can be earned for completing a flight properly in the best time.

There are three weather conditions that can be picked in the FLYING mode, clear, windy, or low

cloud. You can also select landing only in this mode. In the MAIL PILOT mode, you can select various levels of experience, STUDENT, PRIVATE, SENIOR, and COMMAND, each one giving more random weather conditions and aircraft failure problems.

The controls that operate the aircraft are the number keys from 0 to 9 for zero to maximum engine power. The 'L' key toggles the landing gear up or down. Don't push 'L' when you are on the runway—most embarrassing. Key 'F' sequences the flaps through 0, 20, or 40 degrees. You can look to left, right, or rear by pressing the arrow keys. The joystick controls the aircraft's attitude during flight and direction of taxi movement on the ground. These limited controls simplify the flying procedures.

The screen display while on the ground and in the air is a view of the aircraft as seen from about 1000' behind it. When you bank, the plane tilts, but not the horizon. However the background does scroll, simulating forward movement and change of direction. You normally will see the ground and if you fly over a change in terrain height, this will be noticeable, especially when flying through mountain passes. In front of you is the instrument display. This panel consists of two large circular dials, for altitude above sea level and airspeed. A smaller circular dial at center top shows the artificial horizon, very useful when flying through cloud and you are trying to keep on a straight heading. Under this dial is a vertical throttle indicator. At the left is a group of digital displays for pitch (how much bank is on), flap position indicator, heading readout from 0 to 359 degrees clockwise, and a rate of climb indicator. Just to the right is a small compass displaying the 8 points N, NE, E, etc. as you turn. Under the air speed indicator are the fuel gauge and landing gear and brake lights. Below these are the I.L.S. display for aid in landing, and two V.O.R. readouts that give your relative bearing to two fixed transmitters in each flying area.

If this all looks terribly complicated, there is a 16 page booklet that explains all in a very understandable way. In this booklet are detailed charts of the three flying areas showing the appearance of each airfield and other landmarks. Situated on these charts are the radial bearings for each of the V.O.R. stations in 30 degree increments. The booklet also goes into the valid procedures used in real flight situations that can be applied to this program. You can tell that the author, Sid Meier, is an experienced pilot by the nice touches he used in the program and documentation.

Although this program departs from a true fight simulation and would not be too useful for pilot training, the basic structure of SOLO FLIGHT is credible and makes for an absorbing experience to operate. With its many options and the unexpected situations that come up, this is not a program one would tire of easily. Thanks MicroProse, for offering Atari users such a novel and entertaining program.

DRELBS

**Reviewed By Tim Ruscheinsky
Synapse Software**

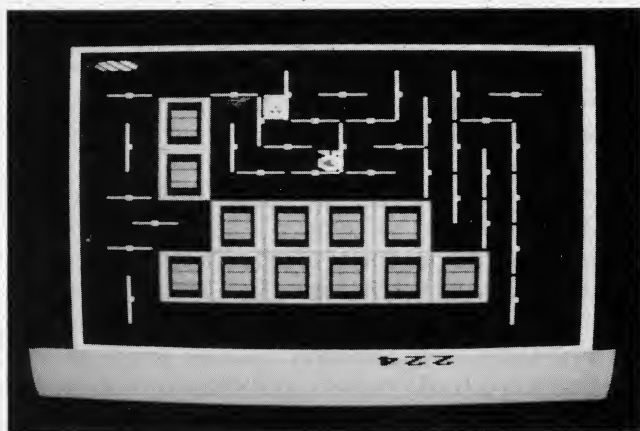
Being the last uncaptured Drelb, you must defeat the Trollaboars on the atomic flip grid in order to advance thru the Drelbish windows to the dark corridor. Once having entered the dark Corridor it is your duty to save imprisoned Drelbs who are guarded by the evil Gorgolytes. Beware, because you'll always be hunted, persuaded and even eliminated through out your quest, to save the Drelbish Kingdom, by freeing all. Your quest consists of eight journeys through the atomic flip grid and the dark corridor.

I put my joystick into my Atari, hit the START button and away I hopped. Okay, I arranged the walls into boxes and started completing the grid. All was going well, until that darn green Gorgolyte appeared on the grid with a damsel yelling for help. Of course I ran to save her, but I was just too slow. Oh well, maybe next time. There was now only four Drelbish lives left to finish the grid. Just one more to go! Zap! That screwy screwhead tank shot me right between the eyes. No problem, I still had three lives left and only one box to go.

Oh no! It was that Trollaboar after me again. Rats! The green Gorgolyte had disassembled one of my completed boxes. Finally, I got all the boxes on the grid, and the windows with Gorgolytes appeared. There was a Drelbish window close by, I ran, jumped, and missed. Well, two lives were left. No, I don't believe it, I was too slow again. The window was gone and my score was rapidly decreasing. I started to quickly box in the grid, after a few completed boxes my score increased once again. Completing the grid, the window and Gorgolytes returned. Then another window, I jumped, this time I made it into the dark corridor. Quickly hopping and dodging bullets, I saved as many Drelbs as I could. Boy, was that Gorgolyte a good shot, yes, once more I died.

I now had only one life left and knew this had to be it. I cruised through the boxes, blasted through the window and swept through the dark corridor saving all the Drelbs and I advanced to the next level. To my surprise instead of just one screwhead tank chasing me around, there were now two. As you probably guessed, I died in a matter of seconds. But before I played again I took a few lessons from the Raving Reviewer.

One of the first things I learned from this and any other game, is to read the instruction booklet which is provided. Secondly, I found out things that could make life easier for a little Drelb, such as trapping a Trollaboar in a completed box, which immobilizes him for a short time. Also little hearts appearing on the grid freeze the Trollagozrs for five seconds when run over by a Drelb. Another question I was asking



myself, "Why save the damsel in distress?" The answer is that you get a big kiss and bonus points based on the number of boxes you have closed. The Gorgolytes are no threat to you unless you run into their boxes.

Finally, the diamonds appearing on the gird create a short cut to the dark corridor by bringing in a window earlier, before all the boxes have been completed. Remember, get through the all the windows as fast as possible, or time will run down and so will your score.

In conclusion, I highly suggest that you get your copy of Drelbs, especially if you enjoy well made maze games. The graphics are nicely detailed and colorful, and the sound is very different. The game is challenging with good documentation, and you can play it for a long time without losing interest.

Ratings

Drelbs

Synapse Software

Playability:9

Challenge:9.1

Graphics:9.3

Sound:8.2

Documentation:8.2

Overall Rating:8.8

The Cartridge Emulator (Version 1.0)

Reviewed By Geoff Corry

Dynasty Engineering

How would you like to have all your favorite cartridge programs available on a disk, with an autorunning menu so that you can easily select the program of your choice? Each side of a disk would have up to five 16K programs, or up to ten 8K programs, and if you could find that many, up to twenty 4K programs. Star Raiders, Space Invaders, Pacman, and other classic games are 8K programs. Most of the newer cartridges, such as Joust, Oil's Well, etc., are 16K programs.

Included with the Cartridge Emulator package are:

- 1 Cartridge Emulator hardware
- 1 Utilities Package disk

Option available:

- 1 Extender Board

For those that don't have a disk drive, a cassette version is available which creates boot cassettes of your favorite cartridge programs.

System requirements :

- 1 Atari 400,600XL,800 or 800XL computer with at least 48K of memory.
- 1 Q-tip
- 1 Atari 810 or 1050
- or compatible disk drive.
- or with the cassette version:-
- 1 Atari 410 or 1210 cassette recorder.

Let's go through the simple procedures required before using the Cartridge Emulator utilities package for a disk drive system. First, you format a disk and write DOS files to it (options I and H of your DOS 2.0S disk). Next delete DUP.SYS using option D. Now press 'O' to copy a file. Place the Utilities disk in the drive, and type AUTORUN.SYS to get the special menu program. Switch back to your disk to write AUTORUN.SYS.

When backing up any language or utility (such as Atariwriter), do not follow the above procedure. Instead, just format a disk and write DOS to the disk. After backing up a cartridge to disk, simply boot up the disk and wait for the DOS menu to appear. Then, using the 'L' option, binary load the program saved on disk. The reason for this is the language program or utility makes use of DOS to handle all disk interactions.

Here's where the Q-TIP comes in. Turn off the computer and open the cartridge door. Use a nice Q-TIP to hold the interlock switch down while the door is open.

Put the utilities disk in the drive and turn on your computer. If the Q-TIP is doing its' job properly, the main menu will be displayed. You have four options to choose from, 'A' to 'D'. Option 'A' is the Cartridge to Disk Emulator program that will provide the most use.

If you press 'A' and follow the prompts, you will be asked to insert your prepared disk and type in the program name. Next, you VERY carefully plug in the desired cartridge. (Dynasty offers an optional cartridge extender card with power cutoff switch to avoid power glitches when inserting the cartridge). Press START, and the program size will be displayed and the cartridge contents will be written to disk. That's

it! You can stay in this option mode to download any other cartridge programs. By pressing SE LECT, you can see the directory and find out how much free disk space is left.

If you have some disks with the earlier boot download version (0.0) of this utility (one program per disk), then use option 'B' to transfer these programs to this multi-file disk format. No Q-TIP is required here, just your old boot load disk and a prepared disk with sufficient space to hold your program. Again, you follow the prompts to transfer a program easily, and in the bargain, free up that boot load disk for another use.

Option 'C' is directed to the developer of a cartridge based program. This option will allow the programmer to write the complete code for cartridge operation and then test run the program before committing it to firmware (ROM or EPROM). In addition to the disc that contains the new program, the Emulator card must be in the normal cartridge slot before running.

Option 'D' will convert most direct cartridge dump files to the Cartridge Emulator format. There are many commercial and public domain programs that download cartridge to binary load disk files. This option gives you the opportunity to convert them to this new Cartridge Emulator format. This is another easy conversion process.

After you have completed any of the above procedures, you can back-up the disk using the normal 'J' option from DOS. Note, all files created by the Cartridge Emulator utility are DOS 2.0 binary files and can be moved about freely using good old DOS.

Remember, you must use the Cartridge Emulator card plugged into the cartridge slot (left slot on the 800) when you run any programs with this disk format.

I have found this product very easy to use, with a great deal of human engineering designed in the utility, making it hard to go wrong. There are obvious benefits to consolidating cartridge source programs.

Another great feature is that when you want to run the programs, you don't need the cartridge door open once the Emulator is in place, and you don't need to flip any switches. The Emulator is fully automatic...another great human engineering feature.

And for the price of a game, the Cartridge Emulator is certainly a very affordable product.

LIGHT PEN

Learning to program a computer is, at best, time consuming. Many impatient students have reverted to purchasing a large variety of programs intended to simplify programming. A good example is Broder-

bund's Arcade Machine. It does wonderful things, but oh, that ever-present manual! Looks like reading is a pre-requisite, unless you just want to create pictures. If that's the case, have I found the right toy for you!

A package recently arrived on my doorstep. Eager to get on with the business of trying it out for the first time, I quickly fired up the Atari and the Tech-Sketch Light Pen.

My two and a half year old son relieved me of this new 'toy' the moment that I drew my first line. It's true that Jonathan reviews many new products with me, but this time the little guy went too far. He played with this new gadget for nearly two hours, and reluctantly handed it over to me when it was time for him to go to bed.

What can this light pen do to create this kind of response? First of all, it isn't really a 'toy'. It could be better described as an educational tool that can teach a child shapes and form when used in the 'Figure' mode. Touch the pen to the screen and locate the circles' epicenter, then touch the pen anywhere else to designate its' radius, and the program will draw the circle. Want to place a triangle inside the circle? Touch 'Triangle' at the bottom of the screen, mark out its' radius, and the program will draw the circle. Want to place a triangle inside the circle? Touch 'Triangle' at the bottom of the screen, mark out its' three points, and voila; one only, made to measure triangle. It does rectangles too, which were great when I finally got to doodle. This brings us to yet another use for this pen.

It is the perfect Executive's toy. No more waste paper . . . no more trying to find a pen or pencil . . . and no need to be on the telephone to justify your doodles to all and sundry. You can save your pictures to disk, so that, should you ever need psychiatric help, your permanent record could be followed by the good doctor to pinpoint the exact moment you went off the deep end.

Last, but not least, this light pen will bring out the artist in the least artistic of us. In the 'Sketch' mode, creating scenery (unfortunately in only three colors: orange, blue and green) I found this pen quite addictive. So far I've not saved any of my pictures to disk for fear they may get into the wrong hands, but I have created a desert scene, a city skyline, and some strangely shaped orange flowers that remotely resemble Pac-Man. It's easier to use than pencil and paper. Just select 'Fill', and point the pen in the direction of that which you wish filled, and it's done in any of the three colors.

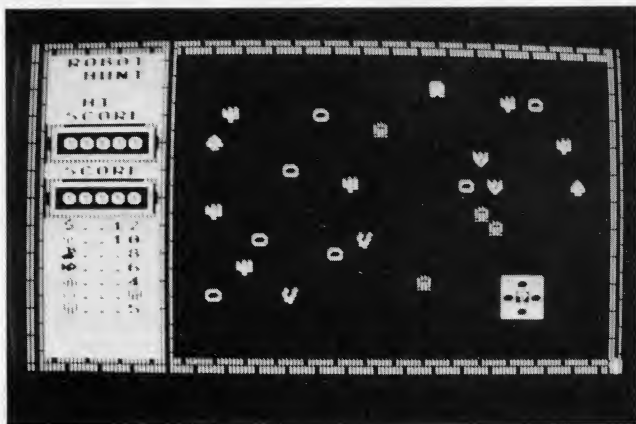
For parents of children with an urge to draw, it is invaluable. Just imagine the hours of fun drawing pictures, without one wall in the house requiring cleaning.

Continued on Page 62

ROBOT HUNT

by Tom Tuong Tran

The year is 2016 and earth has been taken over by robots due to an evil ruler name Zorek. Because Zorek was very powerful, the robots would listen to his every command. You take on the role of Bacork, leader of the rebellion, in order to stop the robots. Since Zorek had taken away any weapons that could be used against himself, the Rebels had to use their brains to defeat the fiendish ruler. This plan entailed you luring Zorek's robots into the death traps that are located in the forest of Nune.



These traps have to be set first before the robots can be imprisoned. Each trap appears randomly on the screen after each robot is caught. They are set by moving your hero into the box with a question mark inside. After grabbing the question mark, one of six things will appear inside the trap. It will be either a Dollar sign(12 points), Medal(10 points), Vase(8 points), Fish(6 points), Bomb(4 points), or a magic circle. This magic circle will allow you to kill the robots. To activate the trap you must grab whatever is inside the box. The trap will then be activated. Once you have done this, a key will appear on the screen. With your hero, pick up the key. This is the key that you'll use to lock in the robot.

Push your joystick in any one of eight directions to move Bacork around the screen in order to lure the robots into the traps. The robots will go in only through the space where you picked up the object. Once the robot is inside the trap go to one of the three

remaining doors. Move your joystick to lock the robot inside. This will imprison the robot for good. Once you have imprisoned five robots, the level will end and a new screen will appear. Bonus points will then be added to your score.

Each level consists of: From one to ten robots(depending on level), randomly placed poisonous vegetation(one touch and you lose a life), and holes where Bacork can fall in. This game, written in graphics mode zero, uses a redefined character set to draw all of the graphics. Different colors are made by turning on every second pixel. Have fun entrapping Zorek's robots. **This game requires 32K and one joystick.**

```

1 REM -----
2 REM -ROBOT HUNT
3 REM -BY:Tom Tuong Tran
4 REM -ROM MAGAZINE ISSUE 6
5 REM -----
6 DIM X1(10),Y1(10),P(10),X(10),Y
  (10),Q$(40):LEVEL=1:C1=1
7 FOR Q=8+16 TO 2+16 STEP -1:GRAP
  HICS Q:? #6:? #6:? #6;"      ROBOT
  HUNT":? #6:? #6;" BY: TOM TUONG
  TRAN":POKE 77,0
8 FOR W=1 TO 100:NEXT W:NEXT Q
9 ? #6:? #6:? #6;"      PLEASE WAIT.
  .."
10 GOSUB 1000
11 FAST=0:GRAPHICS 0:SETCOLOR 2,0
  ,0
12 LBYTE=PEEK(560):HBYTE=PEEK(561
  ):SC=LBYTE+HBYTE*256+4:POKE SC-1,
  64+7
13 FOR Q=1 TO 3:POKE SC+Q+1,6:NEX
  T Q
14 FOR Q=1 TO 15:POKE SC+Q+4,2:NE
  XT Q
15 FOR Q=1 TO 4:POKE SC+Q+19,6:NE
  XT Q
16 POKE 82,1:POKE 752,1:POSITION
  5,0:? "robot hunt":? "BY: TOM TUO
  NG TRAN"
  
```

Robot Hunt (cont'd)

```

18 POSITION 3,17:? "OPTION=LEVEL=
1":? " START=BEGIN":POKE 756,CH
SET/256
20 K=2:V=1:E=1
40 K=2:Q$="!- THE MAGIC POWER THA
T WILL HELP YOU":GOSUB 70
41 V=2:Q$=" DESTROY THE EVIL RO
BOTS":GOSUB 70
42 Q$="#- THE KEY TO THE TRAP":GO
SUB 70:E=6
43 Q$="$=12 POINTS % =10 POINT
S":GOSUB 70
45 Q$="&=08 POINTS ' =06 POINT
S":GOSUB 70
47 Q$="(=04 POINTS r=05 POINT
S":GOSUB 70
50 GOSUB 75:GOTO 20
70 FOR Q=1 TO LEN(Q$):POSITION Q+
E,K:? Q$(Q,Q):FOR S=1 TO 5:GOSUB
80:NEXT S:NEXT Q:K=K+V:RETURN
75 POSITION 1,2:FOR Q=1 TO 15:? "

":NEXT Q:RETURN
80 IF PEEK(53279)=3 THEN LEVEL=LE
VEL+1:IF LEVEL>10 THEN LEVEL=1
81 POSITION 16,17:? " ";CHR$(3
0);CHR$(30);LEVEL:IF PEEK(53279)=
6 THEN 90
83 RETURN
90 REM -ACTION START FROM HERE ON

95 GRAPHICS 0:POKE 756,CHSET/256:
ROBOT=3:CL=80:SETCOLOR 2,(LEVEL-1
)*2,0:CASE=0:FLAG=0:Z=0:COUNT=0:S
CORE=0
99 SCREEN=PEEK(88)+256*PEEK(89):M
OVE=SCREEN+40*Y+X:P(1)=SCREEN+40*
Y(1)+X(1)
110 ? :FOR Q=1 TO 22:? " ":
NEXT Q:POKE 752,1
115 POSITION 2,1:? "ROBOT":? " H
UNT";CHR$(29)
117 ? " HI ":FOR Q=1 TO 2:? "
SCORE ":? CHR$(12);CHR$(18);CHR$(
18);CHR$(18);CHR$(18);CHR$(18);CH
R$(123)
135 ? CHR$(124);"00000";CHR$(124)
:? CHR$(26);CHR$(19);CHR$(19);CHR
$(19);CHR$(19);CHR$(19);CHR$(11):
NEXT Q
140 POSITION 7-C1,7:? HI
150 FOR Q=SCREEN TO SCREEN+39 STE
P 2:POKE Q,85:POKE Q+1,86:POKE Q+
40*23,86:POKE Q+40*23+1,85:NEXT Q
160 FOR Q=SCREEN TO SCREEN+40*23

```

```

STEP 80:POKE Q,87:POKE Q+8,87:POK
E Q+39,87:POKE Q+40,88:POKE Q+48,
88
170 POKE Q+79,88:NEXT Q
180 ? CHR$(29);CHR$(29);CHR$(29);
CHR$(29);CHR$(29);" $.12 ":? " %
..10 ":? " &...8 ":? " '...6 "
190 ? " (...4":? " !...";CHR$(16)
:? " ";CHR$(16);"...5 "
200 FOR Q=1 TO LEVEL*5
210 GOSUB 950
220 POKE A,65+RND(0)*4
230 NEXT Q
250 FOR PO=SCREEN+21*40+2 TO SCRE
EN+40*21+ROBOT*2 STEP 2:POKE PO,7
9+128:NEXT PO
265 FOR Q=0 TO 10:GOSUB 950:X(Q)=
X1:Y(Q)=Y1:P(Q)=A:NEXT Q
270 RESTORE 4000
280 GOSUB 3500:GOSUB 591
310 IF STICK(0)<>15 THEN GOSUB 50
0
315 IF FLAG=1 THEN Z=Z+1:IF Z>=10
0 THEN Z=0:FLAG=0:CL=80
320 IF CASE<1 AND INT(RND(0)*20)=
0 THEN GOSUB 950:POKE A,31:GOSUB
896:CASE=1:X2=X1:Y2=Y1:U=A
340 FOR M=0 TO FAST:GOSUB 700:NEX
T M
410 GOTO 310
450 IF L=3 THEN SOUND 0,45,10,10:
POKE MOVE,0:KEY=2:SOUND 0,0,0,0:R
ETURN
455 IF L=67 THEN FOR Q=10 TO 70:S
OUND 0,Q,14,7-Q/10:NEXT Q:FOR S=1
TO 10:SOUND 0,120,8,10-S:NEXT S:
GOTO 485
460 A=SCREEN+40*(Y+DY)+(X+DX):IF
PEEK(A)=80 AND L=212 AND KEY=2 TH
EN 490
465 IF L=212 AND PEEK(A)=31 THEN
GOSUB 600:GOSUB 950:POKE A,3:RETU
RN
470 IF L=1 THEN CL=81:FLAG=1:RETU
RN
471 IF L=81 THEN GOSUB 680:RETURN

472 IF L<=9 AND L>=4 THEN POKE MO
VE,0:GOSUB 2000:RETURN
485 GOSUB 800:RETURN
490 SOUND 0,45,10,10:FOR Q=1 TO 1
0:IF P(Q)=A THEN W=Q
491 NEXT Q:SOUND 0,0,0,0
492 GOSUB 896:KEY=0:CASE=0:Y=Y-(D
Y):X=X-(DX):MOVE=SCREEN+40*Y+X:CO
UNT=COUNT+1

```

Robot Hunt (cont'd)

```

493 GOSUB 950:X(W)=X1:Y(W)=Y1:P(W)
)=A:FLAG=1:IF COUNT<=4 THEN RETURN
494 POKE SCREEN+40*21+ROBOT*2,207
:FOR Q=1 TO 22:FOR W=9 TO 38:SOUND
0,W,10,ABS(16-Q)
495 IF PEEK(SCREEN+40*Q+W)<>0 THEN
SCORE=SCORE+1:GOSUB 2010
496 POKE SCREEN+40*Q+W,0:NEXT W:NEXT
Q
497 IF LEVEL<10 AND FAST=2 THEN LEVEL=
LEVEL+1:FAST=0:GOTO 499
498 FAST=FAST+1
499 SOUND 0,0,0,0:COUNT=0:SETCOLOR
2,(LEVEL-1)*2,0:GOTO 200
500 SOUND 0,200,10,10:ST=STICK(0)

510 DY=(ST=13 OR ST=9 OR ST=5)-(ST=14
OR ST=10 OR ST=6)
520 DX=(ST=7 OR ST=6 OR ST=5)-(ST=11
OR ST=10 OR ST=9)
530 SOUND 0,0,0,0:X=X+DX:Y=Y+DY:POKE
MOVE,0:MOVE=SCREEN+40*Y+X:L=PEEK(MOVE)
545 IF L<>0 THEN GOSUB 450
550 POKE MOVE,79:RETURN
591 GOSUB 950:X=X1:Y=Y1:MOVE=A
592 POKE SCREEN+40*21+ROBOT*2,128
:FOR Q=5 TO 10:POKE MOVE,79+128:FOR
S=1 TO 5:SOUND 0,Q*S,10,10:NEXT S
593 POKE MOVE,79:FOR S=1 TO 10:SOUND
1,Q+S+100,10,10:NEXT S:NEXT Q

594 SOUND 0,0,0,0:SOUND 1,0,0,0:RETURN
600 POKE MOVE,0
610 A=SCREEN+40*(Y+DY)+(X+DX)
620 B=4+INT(RND(0)*4):POKE A,B:D=INT
(RND(0)*20)
630 IF D=18 THEN POKE P(W),0:X(W)=X2:
Y(W)=Y2:P(W)=U:FOR Q=1 TO 40:POKE
U,128+80:POKE U,80:SOUND 0,Q,10,10:
NEXT Q
640 SOUND 0,0,0,0:IF D=10 THEN POKE
A,1
670 RETURN
680 SCORE=SCORE+5:GOSUB 2010
681 FOR Q=1 TO 10:IF P(Q)=MOVE THEN
W=Q
682 NEXT Q
683 GOSUB 950:X(W)=X1:Y(W)=Y1:P(W)=A:
RETURN
700 A=INT(RND(0)*(10-LEVEL)):IF A=0
THEN 705
701 RETURN

```

```

705 W=1+INT(RND(0)*LEVEL):POKE P(W),0:
X1(W)=X(W):Y1(W)=Y(W)
710 IF X(W)>X THEN X(W)=X(W)-1
720 IF X(W)<X THEN X(W)=X(W)+1
730 IF Y(W)>Y THEN Y(W)=Y(W)-1
740 IF Y(W)<Y THEN Y(W)=Y(W)+1
750 P(W)=SCREEN+40*Y(W)+X(W)
751 IF PEEK(P(W))=79 AND CL=80 THEN
POKE MOVE,0:GOSUB 800
752 IF PEEK(P(W))<>0 THEN Y(W)=Y1(W):
X(W)=X1(W):P(W)=SCREEN+40*Y1(W)+X1(W)
760 POKE P(W),CL:RETURN
800 A1=PEEK(MOVE):A2=PEEK(MOVE+40):POKE
MOVE,32:POKE MOVE+40,64
805 FOR Q=1 TO 200:NEXT Q
806 RESTORE 3000
807 GOSUB 3500
812 ROBOT=ROBOT-1:IF ROBOT<=0 THEN
N 2050
820 POKE MOVE,A1:POKE MOVE+40,A2:GOSUB
591:RETURN
896 SOUND 0,100,10,10:POKE A+1,212:POKE
A-1,212:POKE A+40,212:POKE A-40,212
897 POKE A+39,128:POKE A+41,128:POKE
A-41,128:POKE A-39,128:SOUND 0,0,0,0:
RETURN
950 X1=9+INT(RND(0)*38)
960 Y1=3+INT(RND(0)*19)
970 A=SCREEN+40*Y1+X1:B=PEEK(A):B1=PEEK
(A+1):B2=PEEK(A-1):B3=PEEK(A+40):B4=
PEEK(A-40):B5=PEEK(A+41):B6=PEEK(A+39)
971 B7=PEEK(A-39):B8=PEEK(A-41)
975 IF B=0 AND B1=0 AND B2=0 AND B3=0
AND B4=0 AND B5=0 AND B6=0 AND B7=0
AND B8=0 THEN RETURN
980 GOTO 950
1000 CHSET=(PEEK(106)-8)*256:FOR I=0
TO 1023:POKE CHSET+I,PEEK(573+I):NEXT
I:POKE 756,209
1001 RESTORE 1005
1002 READ A:IF A=-1 THEN POKE 756,CHSET/
256:SOUND 0,0,0,0:RETURN

1003 SOUND 0,A,10,10:FOR J=0 TO 7:READ
B:POKE CHSET+A*8+J,B:NEXT J

1004 GOTO 1002
1005 DATA 1,0,0,60,66,90,66,60,0

1006 DATA 2,54,54,54,0,0,0,0,0
1007 DATA 3,60,102,102,60,24,24,120,120
1008 DATA 5,0,0,68,84,84,16,124,0

```


Robot Hunt (cont'd)

```

1009 DATA 6,123,30,27,31,124,254,
254,124
1010 DATA 7,0,140,222,251,255,222
,152,0
1011 DATA 8,2,10,8,20,85,85,85,20

1012 DATA 32,60,126,255,219,255,1
26,102,60
1013 DATA 64,195,102,60,102,195,0
,0,0
1014 DATA 65,137,217,219,243,103,
102,60,24
1015 DATA 66,27,219,219,251,255,6
3,24,24
1016 DATA 67,0,126,195,129,129,19
5,126,0
1017 DATA 68,24,60,126,110,243,25
5,24,60
1018 DATA 69,99,102,198,198,108,1
08,120,24
1019 DATA 75,25,25,25,249,249,85,
85,85
1020 DATA 76,85,85,85,95,95,88,88
,88
1021 DATA 79,126,255,219,255,255,
255,60,231
1022 DATA 80,20,85,65,85,85,85,20
,85
1023 DATA 81,40,170,130,170,170,1
70,40,170
1024 DATA 83,0,0,0,255,255,85,85,
85
1025 DATA 85,162,162,162,0,170,17
0,170,170
1026 DATA 86,170,170,170,0,138,13
8,138,138
1027 DATA 87,162,162,162,162,160,
162,162,162
1028 DATA 88,162,162,162,2,162,16
2,162,162
1029 DATA 89,85,85,85,255,255,0,0
,0
1030 DATA 90,88,88,88,95,95,85,85
,85
1031 DATA 123,85,85,85,249,249,25
,25,25
1032 DATA -1
1033 DATA -1
2000 SCORE=SCORE+2*(10-L)
2010 SOUND 1,100,10,10:G=SCORE:C=
0
2020 IF G>0.99 THEN G=G/10:C=C+1:
GOTO 2020
2030 POSITION 7-C,11:? SCORE
2040 SOUND 1,0,0,0:RETURN

```

```

2050 POSITION 13,9:? " G A M E -
O V E R ":IF SCORE>HI THEN HI=S
CORE:C1=C
2051 POSITION 10,11:? " PRESS ST
ART TO CONTINUE "
2052 POSITION 13,13:? " OR OPTIO
N FOR MENU "
2060 IF PEEK(53279)=6 THEN 90
2080 IF PEEK(53279)=3 THEN 10
2090 GOTO 2060
3000 DATA 121,30,0,0,121,10,91,80
,121,30,91,10,72,80,121,30,91,10,
72,40,121,30,91,10
3010 DATA 72,10,121,30,91,10,72,8
0,91,30,72,10,60,40,72,30,91,30,1
21,10,0,0,121,80,121,30,0,0,121,1
0,91,80,-1,0
3500 READ NO,SP:IF NO=-1 THEN SOU
ND 0,0,0,0:RETURN
3510 SOUND 0,NO,10,10:POKE 540,SP

3520 IF PEEK(540)<>0 THEN 3520
3530 GOTO 3500
4000 DATA 121,10,91,10,72,5,91,5,
121,10,72,10,91,10,72,5,91,5,121,
10,72,10
4010 DATA 91,10,72,5,91,5,121,10,
91,10,72,20,91,10,-1,0

0 REM * CHECK DATA *
1 DATA 6867,351,283,54,913,355,25
9,757,61,56,893,370,544,366,417,4
26,58,704
20 DATA 9916,962,798,114,751,682,
698,704,313,302,437,111,440,806,3
26,876,750,846
115 DATA 10014,861,909,934,610,20
2,327,556,858,793,485,908,380,768
,34,683,116,590
310 DATA 8146,177,579,796,427,829
,549,610,422,370,399,271,642,486,
281,584,217,507
494 DATA 6321,207,861,607,57,109,
749,78,492,444,38,702,713,105,385
,223,476,75
610 DATA 14245,878,896,988,409,85
6,931,567,779,950,708,851,769,954
,951,960,957,841
751 DATA 10255,628,637,684,107,66
1,120,962,635,354,376,896,465,460
,870,948,601,851
1000 DATA 6308,567,159,80,157,924
,769,657,100,831,175,107,830,275,
14,275,194,194
1017 DATA 6175,180,306,118,40,346

```

Continued on Page 60

THE COVER

by Bob Cockroft

The following is the program that produced the art on the front cover. The entire design was drawn on a graphics 8 screen. The various colours were created by using two methods: artifacting, and adjusting the colour controls on the Television. The distant spaceship was drawn and coloured completely by artifacting. If examined on a non-colour screen, its shape would be seen as a series of vertical lines. By plotting either even or odd pixels, different colours can be created. A similar, but less dramatic effect can be seen with the overlapping circles in the Atari Symbol. The varying background colour is not created with the computer. By experimenting with our televisions colour controls, we were able to get the screen to do some strange things. Multicoloured screens and other bazaar effects were seen and photographed. As the effects got stranger, we tried even more to disturb the televisions normal colour patterns. When it was all over, we had a number of interesting photographs. Although our television may never again work the same, we felt we had a cover for the sixth issue. After much discussion, we finally decided to use the photograph you see on the front cover.

The most mathematically involved part of the cover is the Atari symbol. The circles were created by using the following formula.

$$x^2 + y^2 = r^2$$

The columns of circles were molded into an Atari symbol by three vertical lines. The two outside lines were exponential so that they curved upwards.

$$y = x^2$$

The center of the circles were placed on each of these lines. The lines were then erased to reveal the shape you see.

```
2 P=1
4 RDU=20
5 F=85
6 CT=0:RAT=15:RAT1=RAT
7 B=130
8 C=130
10 GRAPHICS 8
20 COLOR 0
30 SETCOLOR 2,16,1
40 XP=60:YP=B
```

```
50 X=0:Y=0
100 PLOT XP+X,YP+Y
105 IF CT=0 THEN RDU=RDU-1:GOTO 400
110 X=X+1:CT=CT+1
120 Y=-1/C*(X*X)
130 RAT1=RAT1-0.155:IF CT>RAT1 THEN CT=0
140 IF X>F THEN FIN=YP+Y:GOTO 200

150 GOTO 100
199 REM * DRAW ATARI SYMBOL *
200 XP=265:YP=B:CT=0:P=2:RAT=15:RAT1=RAT:RDU=20
205 XP1=265
210 X=0:Y=0
220 PLOT XP+X,YP+Y
224 IF CT=0 THEN RDU=RDU-1:GOTO 400
230 X=X-1:CT=CT+1
240 Y=-1/C*(X*X)
250 IF X<-1*F THEN 300
255 RAT1=RAT1-0.155:IF CT>RAT1 THEN CT=0
260 GOTO 220
300 XP=INT((60+265)/2)+1:P=3:RAT=12:RAT1=RAT:RDU=20
305 X=0:Y=0:YP=B:CT=0
310 PLOT XP,YP+Y
312 IF CT=0 THEN RDU=RDU-1.45:GOTO 400
314 Y=Y-1:CT=CT+1
315 RAT1=RAT1-0.15:IF CT>RAT1 THEN CT=0
317 IF YP+Y<FIN THEN 1000
320 GOTO 310
399 REM * DRAW CIRCLES *
400 FOR XX=XP+X-RDU TO XP+X+RDU
405 COLOR 1
410 YY=SQR(RDU*RDU-((XX-(XP+X))*
XX-(XP+X))))+YP+Y
415 YYY=SQR(RDU*RDU-((XX-(XP+X))*
XX-(XP+X))))*-1+YP+Y
420 PLOT XX,YY
425 PLOT XX,YYY
490 NEXT XX
496 COLOR 0
500 IF P=1 THEN 110
510 IF P=2 THEN 230
```

The Cover (cont'd)

```

520 IF P=3 THEN 314
999 REM *DRAW SPACESHIP *
1000 COLOR 1
1010 PLOT 145,68
1020 DRAWTO 150,50
1030 PLOT 181,68:DRAWTO 150,50
1040 PLOT 162,68:DRAWTO 150,50
1050 PLOT 150,50:DRAWTO 150,46
1060 PLOT 152,50:DRAWTO 152,46
1070 PLOT 154,49:DRAWTO 154,45
1080 PLOT 156,49:DRAWTO 156,45
1090 PLOT 148,51:DRAWTO 148,47
1100 PLOT 146,52:DRAWTO 146,48
1110 PLOT 144,52:DRAWTO 144,48
1120 PLOT 143,53:DRAWTO 143,49
1130 PLOT 141,53:DRAWTO 141,49
1140 PLOT 139,52:DRAWTO 139,48
1150 PLOT 137,51:DRAWTO 137,47
1160 PLOT 135,50:DRAWTO 135,46
1170 PLOT 133,49:DRAWTO 133,45
1180 PLOT 131,48:DRAWTO 131,44
1190 PLOT 129,47:DRAWTO 129,43
1200 PLOT 127,46:DRAWTO 127,42
1210 PLOT 125,45:DRAWTO 125,41
1220 PLOT 123,44:DRAWTO 123,40
1230 PLOT 121,43:DRAWTO 121,39
1240 PLOT 121,38:DRAWTO 121,39
1250 PLOT 122,38:DRAWTO 122,39
1260 DRAWTO 123,39:DRAWTO 123,40:
DRAWTO 124,39:DRAWTO 124,40:DRAWTO
O 125,39:DRAWTO 125,40
1270 PLOT 126,39:DRAWTO 126,41:DR
AWTO 127,39:DRAWTO 127,41:DRAWTO
128,40:DRAWTO 128,42
1280 PLOT 129,40:DRAWTO 129,42:PL
OT 130,40:DRAWTO 130,43
1290 PLOT 131,40:DRAWTO 131,43:PL
OT 132,40:DRAWTO 132,44:PLOT 133,
41:DRAWTO 133,44
1300 PLOT 134,41:DRAWTO 134,44:PL
OT 135,41:DRAWTO 135,45:PLOT 136,
41:DRAWTO 136,46
1310 PLOT 137,41:DRAWTO 137,46:PL
OT 138,41:DRAWTO 138,47:PLOT 139,
42:DRAWTO 139,47
1320 PLOT 140,42:DRAWTO 140,48:PL
OT 141,42:DRAWTO 141,48:PLOT 142,
42:DRAWTO 142,49
1330 PLOT 143,42:DRAWTO 143,49:PL
OT 144,42:DRAWTO 144,48:PLOT 145,
43:DRAWTO 145,48
1340 PLOT 146,43:DRAWTO 146,47:PL
OT 147,43:DRAWTO 147,47
1350 PLOT 148,43:DRAWTO 148,46:PL
OT 149,44:DRAWTO 149,46:PLOT 150,
44:DRAWTO 150,46

1360 PLOT 151,44:DRAWTO 151,46:PL
OT 152,44:DRAWTO 152,45:PLOT 153,
44:DRAWTO 153,45
1370 PLOT 154,44
1380 PLOT 155,44
2998 PLOT 134,45
2999 REM * DRAW MOUNTAINS *
3000 PLOT 1,50:DRAWTO 50,35
3010 DRAWTO 65,45
3020 DRAWTO 76,41
3030 DRAWTO 100,55
3040 DRAWTO 133,50
3045 PLOT 137,44
3050 DRAWTO 160,25
3060 DRAWTO 195,48
3070 DRAWTO 210,55
3080 DRAWTO 250,35
3090 DRAWTO 275,40
3100 DRAWTO 300,35
3110 DRAWTO 319,50
3120 PLOT 1,100:DRAWTO 101,100
3125 PLOT 138,100:DRAWTO 149,100

3130 PLOT 175,100:DRAWTO 185,100

3140 PLOT 224,100:DRAWTO 319,100

3199 REM * DRAW STARS *
3200 PLOT 10,10:PLOT 90,12:PLOT 3
00,5:PLOT 250,15:PLOT 125,14:PLOT
114,7
3205 PLOT 50,19:PLOT 129,8:PLOT 2
95,17
3210 PLOT 275,10:PLOT 175,25
3220 PLOT 230,8:PLOT 200,1:PLOT 2
05,15
3230 PLOT 212,30
3240 PLOT 75,1:PLOT 100,32
3250 PLOT 160,10
3260 PLOT 25,32

1 REM * CHECK DATA *
2 DATA 8495,427,633,480,583,517,5
19,965,748,227,972,741,327,315,17
5,33,603,230
150 DATA 7757,827,963,174,773,787
,330,317,180,36,381,611,832,232,4
64,199,466,185
315 DATA 8677,555,659,829,611,218
,804,290,520,86,180,871,813,214,2
19,224,740,844
1010 DATA 13661,40,174,892,892,88
6,891,903,908,906,896,893,894,891
,904,899,894,898
1180 DATA 8940,893,906,892,887,88
2,886,891,894,454,323,449,1,17,42

```

Continued on Page 62

ROM GOES TO THE FAIRE

by Peter Ellison

ROM went to the 9th West Coast Computer Faire which was held on March 22-25 at San Francisco's Civic Auditorium and Brooks Hall. The show, one day longer than last years', featured more than 300 hardware and software exhibitors, including ATARI, IBM, TI, Apple, and Radio Shack.



The first day(Thursday), many of the exhibitors thought the show would be a flop, because not too many people attended. That was soon forgotten as during the next three days (Friday,Saturday,and Sunday), people were lined up outside Brooks Hall, long before it even started. I'm glad that we were exhibitors or we may not have gotten in. Admission was quite reasonable at \$12 a person. There was so much to see that many people bought the four day pass for \$20. Over sixty thousand enthusiastic potential buyers passed through the show.

Atari had a large exhibit with over fifteen television

sets displaying either game, business, or educational program on the screen. This was very popular with the kids, because no where else can you pay \$12 and play new games all day. One new Atari game that really impressed me was 'Equestrian', a game that was submitted to APX to compete for the Olympic award. This game featured diagonal scrolling of an equestrian course filled with jumps, waterholes, and barrels. I can say that the graphics and play were very good as I, myself, had to play a few games. Another interesting program called 'SYNFILE+' caught my eye. Developed by Synapse Software for ATARI, this home and business management program allows one to create files and records. It also has business applications since it can be used for reports such as expenses, invoices, addresses, and customer lists. This program is a much improved version of the popular Filemanager 800+ from Synapse.

Besides games and business programs, ATARI had some very excellent educational software & hardware to show off. A new line called 'AtariLab Science Series' was one that aroused the interests of many educators. The starter kit contains the AtariLab Interface-a panel that all AtariLab modules plug into-along with everything one would need to set up his own temperature and heat-energy experiments. This package comes with a temperature sensor, an electronic thermometer that sends temperature readings to the computer; plus a standard bulb thermometer for field checks and calibration. This new educational line, developed by a team of science professors at Dickinson College, has created a whole new approach to learning.

Besides being able to use the AtariLab interface with the cartridge supplied, students can write programs in Basic or whatever, to access the AtariLab interface and make up their own experiments. A second module is available at this time called AtariLab Light Module. Modules being developed for AtariLab that will be out in the near future include: Biofeedback, Timekeeper, Lie Detector, and different Mechanic modules. Why didn't they have this when I went to school?

Also at Atari's booth were some learning programs to help preschoolers. They were: "Juggles" House for Ages 3-6", and "My first Alphabet for Ages 3-5" (an oldy but goody from Fernando Herrera). Another interesting program was "TIMEWISE", a program to



help a person keep track of his own time. This can be used to track one or several people's calendars or even a small business. That's all at this time for ATARI but we'll probably see them again this summer at the Consumer Electronics Show in Chicago.

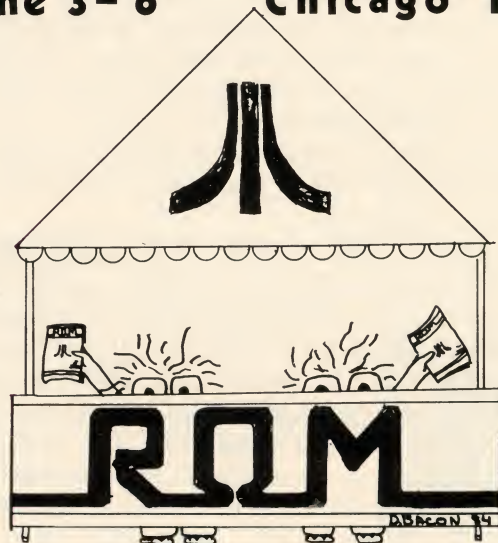
Also at the show was Bill Wilkinson and the staff from OSS demonstrating ACTION! (reviewed in this issue), BASIC XL, and MAC-65. Other new products included a word processor called, 'The Write Tool', a mailing list program called, 'The Postal Tool' and 'Sort Tool', and a special program for printing text called, -what else, -'The Print Tool'. Their booth, being right across from ATARI, put them in a very busy intersection. ROMOX was also at the show with an innovative way of selling software. They have a new machine that allows one to bring back his cartridge when he or she is bored with it, and have it reprogrammed. The cost of this is a fraction of that of a new cartridge. They offer a wide range of games from different companies to choose from. This type of thing is something for the future.

Amdek had their 3" Micro-Floppy Disk Drive for the Atari showing the vast amount of information that can be stored on one disk. One double-sided cartridge can store 720K bytes, 8 times the storage available on single-density 5 1/4" diskettes. Although not much software is available on these cartridges right now, plans

are being made with major manufacturers to satisfy this requirement. Strategic Simulations was also there in full force, showing off a new fantasy adventure game, 'Questron'. Although they didn't have the Atari version ready when we were there, it should be out by the time you read this article. Another program, just released, that is sure to be a classic is 'BroadSides'. In it you are the captain of an 18th century warship having to fight other ships in an arcade of strategic situation. 'Rails West', a simulation of buying and selling railways back in the 1870's, was also just released (reviewed in this issue), adding another excellent addition to SSI's product line.

The Jay Gee Programming Company were showing their latest learning tool, 'Attack of the Spelling Bees'. This game, which is 100% machine language, is an educational arcade-action spelling game for the ATARI. The game makes use of the joysticks, having the player move his bumblebee near the letters. The game disk contains 250 common words. Additional lists are available from Jay Gee. That's about all I saw at this fair, but will have more for you in the next issue after we have been to the Consumer Electronics Fair in Chicago.

See you at the fair
1984 SUMMER CONSUMER
ELECTRONICS SHOW
June 3-6 Chicago IL



BOOKS ON THE SHELF

by Gabe Torok

Some time ago I was thrilled when I discovered a set of fifteen disks that teach programming on the ATARI. I bought them, and tried to learn programming. The crash course that I set for myself left a lot to be desired, and I learned next to nothing.

Then I got my hands on a terrific book by IJG, called Atari BASIC Faster and Better, but this book assumed I knew more about BASIC than I was willing to admit. The book gave me a lot of extremely useful information and utilities that I could incorporate into my programs, but I still knew nothing of actual programming.

In a way, I'm no different from most people. I bought this wonderful computer, and almost before it was unpacked, I had it fired up and loaded with a newly acquired program. Then, when something didn't work quite right, I broke down and opened the manual. I read only the portion of the manual which, in the table of contents, referred to that which resembled what 'wasn't working right'. I read it, corrected the problem, and proceeded with my wonderful new arcade game.

My DOS manual collected dust for a long time and I would only read those pages for which I had immediate need. To go through fifteen tutorial programs to learn programming seemed ludicrous. Before I could do it properly, I would have to know a lot more and read more than I was willing to, at that time.

Those days are in the not too distant past, but they haunt me to this day. Had I followed all the prescribed steps, I would have saved many hours of flipping through books and manuals for some obscure step that I cannot remember for all the tea in China.

The importance of setting the stage for any program finally hit home. But before you set the stage, you have to have the script.

Consider yourself a novelist. Write a short outline of your novel, including plot, counterplot, a few twists in the story action, and provide the basic background as to where the story will take place. From this point on, the novelist can expand upon his main theme without losing track of the original intent, main plot, and the main substance of his story. The meat added to this skeleton of an outline is nothing more than windowdressing. This can be altered at will without destroying the story. Who cares what color Lady

Godiva's horse was? The story says white, but to the people watching, it could've been pink with purple polka dots. All the focus and attention was on her long golden hair and what this hair hid from view. It was unnecessary to describe what was being hidden.

Do NOT state the obvious. When writing computer programs, use the same format as writing a book, and leave enough room for each players' imagination to complete the picture.

Once you have the outline, the next step will cost you about \$24.00. I know that I am the type of person who reads manuals and any other form of instructions only under duress, and that I am writing this for those of you who happen to have this idiosyncrasy in common with me. But, I found a book/disk combination at the recent West Coast Computer Faire that may change all this. The book is as easy to read, as a ten-foot STOP sign. It holds the readers' interest thoroughly, but then, what book wouldn't with a title like, 'Dr. C. Wacko's Miracle Guide to Designing and Programming Your Own Atari Computer Arcade Games'. Published by Addison-Wesley Publishing Co. Inc., written by David L. Heller, the book contains step by step instruction on building your programming knowledge from virtually nothing.

Each chapter forces you to enter a set of short programs as examples, then prompts you to play with the program by changing it, adding to it, etc., and thus, learning from visual results. It's very effective. The need to have a basic knowledge of BASIC has been virtually removed.

The disk contains forty nine different programs, utilities, and games, all aimed at getting you started on the programming adventure of your life! The only additional reading required is noted on the first few pages of the book, referring you to page 35 of your DOS manual.

Finally, the real good news! The instructions in this book can be used on any Atari Home Computer. Try it on your new 800XL, and let me see your first arcade game in a month!(In ROM)



MORE UTILITY.



TOP-DOS: The DOS Atari should have written.

TOP-DOS is a powerful, user-friendly Disk Operating System (DOS) that gives you more functions and features than any other DOS written for Atari computers. Yet TOP-DOS is compatible with Atari software.

Here are a few of the features and commands you can expect to find in TOP-DOS.

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Turns large jobs into small ones.

You'll find all the familiar features of Atari DOS 2.0 in TOP-DOS but with added functions and six new commands.

Turn your major disk operations into small tasks with the ability to create a file of commands that can be executed in a single line. Or restore deleted files with one command.

FLEXIBLE

Tailor TOP-DOS to your needs.

TOP-DOS is flexible to meet the needs of virtually any user.

For example, the file directory can be listed in multi-column format to help you find your files. The amount of your

What independent reviewers say of TOP-DOS:

"TOP-DOS gives the user many advanced features found only in systems running on much larger machines. . . . This DOS is fast, easy to use, and extremely powerful, but most of all, a bargain. . . . a best buy in the software marketplace."

Larry Dziegielewski, ANTIC

"The UNDELETE command is superb—one of the best things to come along in a long time."

Bill Howey, A.N.A.L.O.G.

"The first thing that really impressed me was the full use of the screen, giving me access to a large amount of work history."

Peter Ellison, ROM

involvement in file manipulations can be changed with the many options available. System parameters can be tailored to your preference with the SET command.

FRIENDLY

TOP-DOS interacts with you.

Use computer prompts when you need help. As you gain experience switch to one-line commands for more speed.

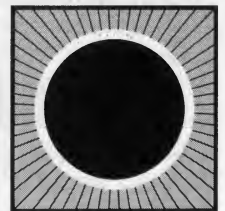
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And there's no risk. TOP-DOS is guaranteed to please you or return it within 30 days for a full refund.

SAVE \$10

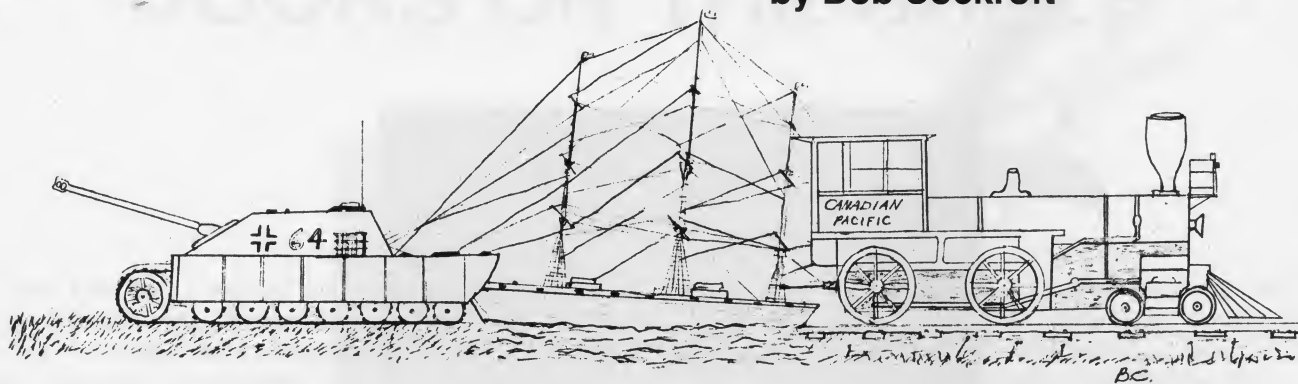
If you order TOP-DOS before June 1, 1984 you will save \$10 off the regular price. Order today and get more from your disk drive. Send a check or money order to ECLIPSE, 1058-R Marigold Court, Sunnyvale, CA 94086. Or call (408) 246-8325.

ECLIPSE



Strategy Zone

by Bob Cockroft



By combining various aspects of the business environment with numerous strategic options, Rails West recreates the era of the frontier railroads in an interesting way. Being the best business strategy game I have yet played, it provides excitement even for the person who had not in the past enjoyed strategy games.

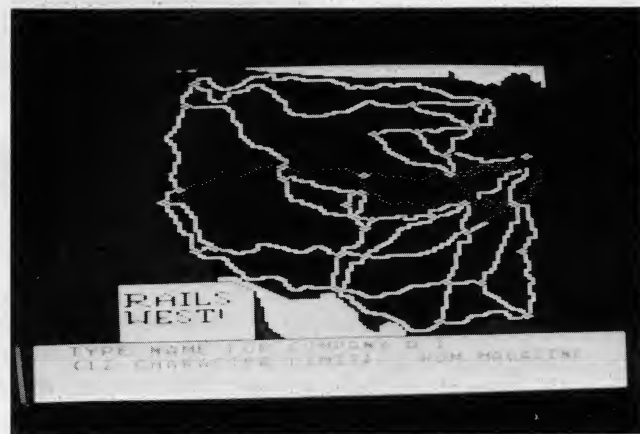
Rails West is a game in which the players are 19th century, western American railroad barons who must strategically invest, and compete with each other in order to maximize their wealth. Buying stocks and bonds, these barons seek control of desirable railroads. However, poor economic conditions and actions of competitors may destroy even the best planned strategies. With corporate take-overs, bankruptcies, loan defaults and other business occurrences, a realistic simulation is created.

Because of good strategical design, Rail West is really three games in one. In one sense, it is a game of corporate power struggles. Each player competes with one another for control of the most profitable railroads. Usually not having the needed financial resources, players are able to buy only a small percentage of a company's stock. Although being enough to control the company's decisions, it leaves the present controller open to take-overs from other players. In addition, should the price of the company's stock fall, making the take-over cost less expensive, the current controller's position becomes even more precarious. Although the money from the issuing of stock is needed for expansion, in order to avoid lower prices, the controller must not flood the market with the company's stock.

In another sense, Rails West is a corporate management game. Controllers of companies could attempt to increase corporate profits and dividend yields in an attempt to accumulate personal wealth. Although issuing bonds provides funds for expansion, their interest expense reduces income. On the other hand, the issuing of common stock erodes its market price

and reduces personal control. This conflict between debt and equity adds a needed dimension to the game.

In yet another sense, Rails West is a stock and bond investment game. Players do not need to control cor-



porations. If they wish, players could just speculate on stock and bond prices. Growing companies with high dividend policies could be good buys for the prudent investor. In addition, buying securities during a depression when their prices are low and selling them during a boom when they are higher, investors could make a considerable amount of money.

This game provides for up to four human and four computer controlled players. This capability makes this game much more flexible. In addition, skill levels are created so that there is a challenging game for the more experienced player.

Perhaps one of the interesting aspects of this game is its complexity. A player has many interesting options. This promotes numerous strategies for achieving the same goal. There is no one best tactic, only a handful of methods that may or may not work. As a result, every game is different. When using the option that randomly sets-up the game, completely new strategies must be devised in order to succeed. Because of its complexity, this game is difficult to

master. After spending many hours playing it, I have not yet developed a strategy that ensures a high degree of success.

Unfortunately, Rails West is not without some weaknesses. Although the game has an interesting presentation, it is a little slow. The computer controlled players' seem to take too long to react. The human player wastes time waiting for all the computer controlled players actions to be displayed and performed. However, the computer responses are not excessively slow and so do not greatly detract from the game.

Although this game has an interesting map of the rail system in the western the United States, the process used to identify an individual rail line is poor. A player needs to run through a rather long list of potential rail routes before obtaining the one he wants. A more creative indentification system is needed so that rail lines can be indentified more quickly. Fortunately, this problem affects only a minor part of the game.

Rails West is a success. It does a fine job of recreating the finances of the frontier railroads. The game's many strengths far outweigh its weaknesses. But probably this game's best aspect is its ability to foster economic warfare between players. Rails West is an unique, exciting game and one that I would recommend.

Carrier Force is a game of naval air power during the Pacific campaigns of World War II. Recreating four major battles(Santa Cruz, Midway, Solomons and Coral Sea), this game attempts to depict the scenarios and strategies used by both American and Japanese naval forces. This game reveals an insight into the tactics of carrier warfare. A player obtains an understanding of how some major sea battles of World War II were won and lost.

Carrier Force's greatest strength is it complexity. There are many details that make this game quite interesting. Having played the board game Midway a number of times, I found the Carrier Forces version a refreshing refinement. There are many more types of aircraft, each having their own characteristics. Varying in maximum speed, endurance, bomber accuracy and combat capabilities, aircraft must be carefully chosen for each mission. In addition, there is also a good selection of ship types to choose from. Unlike the board game, this version has added a number of naval vessels that seem to add a needed dimension. Although not significant in themselves, destroyers, tankers, submarines, minesweepers and minelayers, can be used to assist larger craft. Once having located an enemy fleet, it is not always easy for one to direct the attacking aircraft to it. A change in the fleet's

heading or poor weather conditions, can make detection difficult. An attacking force can only be directed to the enemy fleet's last reported position. Instinct and luck must be used from there on. This aspect creates a realistic uncertainty that does not exist in any board game version I have played.

Carrier Force is an exciting and unique game. It promotes strategies that are not found in most war games. Unlike typical land force tactics, this is a game of naval hide and seek. Each naval force hides while seeking the enemy. In addition, a fighter umbrella over the carrier fleets must be maintained for protection against surprise attacks or enemy reconnaissance. The option that provides random set-ups enables numerous battles to develop from the same historical situation. This is not a game that once used can be thrown away. Everytime this game is played, It reveals a new undiscovered aspect of carrier warfare.

This game does have some weaknesses that detract somewhat from its strengths. The graphics are poorer than what one might expect from a game of such caliber. Although this is only a visual shortcoming that does not hamper play, it is something of at least minor concern. The scrolling on the map display is coarse and must be directed by the numbers on the keyboard. In addition, it is not clear from the display which number corresponds with the desired direction. But Carrier Force's biggest weakness is its lack of speed. The game takes too long for it to determine the Japanese operations. In addition, the human player is too often forced to press "C" to continue the game where the computer should do it automatically.

Although being slow, Carrier Force is an excellent strategic game. It provides excitement, tactics and detail not found in most wargames. Its scenarios are enough to satisfy even the most sophisticated wargamer. For those who do not mind waiting for the computer to respond, Carrier Force will bring hours of enjoyment.

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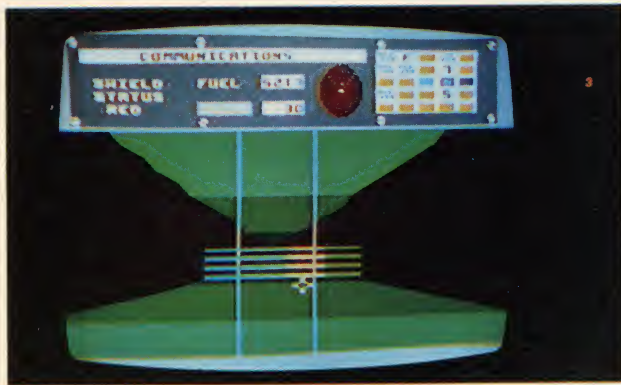
JAKE

THE SOFTWARE DUDE

by Jason Cockroft

Last Wednesday when I was grabbing my weekly burger at Ralphies, I was just downing my 3rd Mc Ralph when I looked up and noticed the cutest little pumpkin I ever saw. Quickly wiping my face, I asked her to grab a seat. She said fine, as long as I didn't use my sleeve again. Anyways we got yapping and the next thing I knew I was picking her up at 8:00 pm Saturday in my Stratochief.

By the time Saturday rolled around, I ran out and bought a brand new pair of shades. I had the evening all planned out. First it was Ralph burgers and then off to Frankie Avalon and Annette Funicello in Beach Blanket Bingo. What an evening.



When I took a good look at that address Saturday afternoon it somehow seemed suspiciously familiar. Anyways I rolled on over there at 8:30 and suddenly realized I was somehow setup. There was no question about it; the gated driveway, the black Maseratti, the elegant Greek styled house,... this was the home of the Raving Reviewer.

It was time to take evasive action! I wheeled my four-door right out of there. I quickly tromped over to the corner store to get my usual weapons: chips, greasy munchies, and sorted carbonated refreshments. I then went home to pick up my personally modified, recircuited, J-stick. Finally, I threw on my usual video combat shirt and grabbed an armful of my



homecooked garlic bread as I went out the door.

When I rolled into T.R.R.'s (The Raving Reviewer) estate, the gateman and the doorman looked at me in their usual disgusted manner. I sneered. They let me in. As I sat there in the waiting room I wondered what was going through T.R.R.'s head. Was I so special that he would get some innocent sweet pumpkin to induce me into his house? I sat and grinned.

In time the Raving Reviewer appeared. He stood at the top of the spiral staircase with that ripening pumpkin by his side. We quickly stepped into his parlor and



pulled out the good ol' ATARI. T.R.R. plugged in two J-Sticks and then to my surprise he turned to introduce me to the European Video Champ, Miss "Quick Game" DeWow. Some pumpkin! Somehow I felt them both looking down at me. I plugged in my J-Stick.

We immediately decided to have a little competition, a sort of world championship you could say. Anyways, we decided on two big new pieces of software labeled "Encounter" and Dimension X." We each got fifteen minutes to get used to the new games.

I first played Dimension X. The first thing that struck me about this piece of software was its great 3-D scrolling graphics. Your basic viewing screen shows a grid shaped desert floor with mountains or a city in the background. You see the wild part of this game is that the floor of the desert actually moves. Each little rectangle that you see in the picture, represents say, a 5 by 3 ft. section of ground. When you start building speed or change direction, these grids go whipping past to form a most realistic and fascinating pattern. For this reason alone I would recommend this game to anyone.

The basic set up of the game is a cross between Star Raiders and the arcade classic Battle Zone. The primary goal as in Star Raiders, is to protect your home base. Of course you have all the necessary equipment to do the job, including Communication Window, Desert map, range indicator (for enemy tanks), shields and a fuel gauge. There are two basic flying speeds of hyper and booster classification. Anyway, you go from sector to sector blowing away all enemy tanks which must be destroyed before leaving. As one can imagine the game develops some interesting strategies.

The actual combat between other tanks, that takes place in the desert sectors, is somewhat similar to those of both Star Raiders and Battle Zone. Although the battle takes place on flat ground like that of Battle Zone, the movement of the enemy tank is much similar to that of the fast moving space ships of Star Raiders.

Yet the real treat I found in this game is the great sequence you must go through in order transfer from sector to sector. A quick physical description of this sequence would be that you have to "fly" your tank through a tunnel in the surrounding mountains and avoid all of the horizontally placed gates. Yet with a masterful use of both sound and graphics, this sequence turns into a wonderous eerie experience. Unfortunately I could only allow my self seven and half minutes on this game and then I was on to the next.

The second game I played was Encounter. The game was basically a remake of Battle Zone except

for a few great modifications. In this game, you are destroying diamond shaped spaceships that appear out of thinly formed envelopes. The best modification made to this game is the fast moving graphics. Although this game does not have the great graphic display of Dimension X, the control one has over the movement of your spaceship, (tank), is superior in Encounter.

The other major modification to this game I noticed was the asteroid belt you must fly through in order to advance to the next level. In this scenario you must quickly guide your ship through a dense asteroid belt.

I found both of these games most competitive as they seem to possess the lasting quality all great games. In a quick comparison I found Encounter to have a better playability than Dimension X, although Dimension X had better graphics. I would recommend these games to anyone and make it "must" for any of you Battle Zone fans out there.

At any rate we decided on Dimension X first. We flipped for position and I ended up starting first. My reflexes were, as always, in top form as I started to blow away the alien tanks. I locked my eyes into an endless glaze as I sat for 5..., 10..., 15 minutes, blasting my way from sector to sector. As time ticked on, I sensed a growing uneasiness in Miss "Quick Game." My game began to improve. T.R.R. remained restrained as usual. By the time the twentieth minute rolled around I was set in for a good long battle, yet suddenly I couldn't shake a maddening alien tank. I glanced up at my plug-in to find my J-Stick detached. By this time I was snuffed. I looked over and notice a laughing T.R.R. who said "Looks like your plug-in is as greasy as your face. Ha! HA!" Meanwhile Miss "Quick Game" seemed quite concerned and was quick to sooth my frustrations.

That little raving reviewer was next. He too, like myself, got off to a great start blowing away tanks for a good fifteen minutes. I knew I was in trouble. Then to my relief, Miss "Quick Game" accidentally spilled her coffee on T.R.R.'s lap. Obviously this brought an end to his turn. I offered him some of my garlic bread to go with his coffee stains. He was not amused. Once again Miss "Quick Game" was most apologetic and quickly soothed any of T.R.R.'s internal frustrations..

Finally we saw the debut of Miss "Quick Game" DeWow. Within 2 minutes T.R.R. and I knew it would be no sweat. She was good, but on a professional level, she was a mess. She was gone within five minutes. T.R.R.'s score and mine easily tripled hers. Due to the freak accidents, T.R.R. and I decided to call the first game a draw.

Before our game of Encounter, we decided to have an intermission. T.R.R. was insistant upon showing this European pumpkin his Wine cellar. As for

myself, I was content with my six pack I'd bought at the corner store. When they returned it seemed that Miss Pumpkinhead or whatever her name was, was once again flattering T.R.R. She came and started to bubble over at me. Somehow I knew something was wrong. I offered her a garlic bread.

Due to the lousy performance by Miss "Quick Game", the competition was broken down to the usual dual between T.R.R. and myself. Sinking deep into my chair, I went first. The alien ships seemed to be coming quicker than ever. Soon the Raving Reviewer grew uneasy as my game began to improve. I shot to the left, dodged to the right and shifted my ship into the reverse direction. There were more shots, more near misses, yet most important, more points. T.R.R. began to twitch. I entered 4th level. As my confidence began to increase.

Suddenly the power went out! ... The room was a black as the Maseratti. Within a couple of seconds T.R.R. had switched on the auxiliary power. With a quick glance we noticed Miss Pumpkinbrain was gone. Suddenly T.R.R. screamed, "My entire R.O.M. collection is gone!" The horror on T.R.R.'s face was enough to scare the garlic right out of my breath.

We heard a scream. T.R.R. and I went rushing towards it. To our surprise we found Miss "Quick-head" captured by the gateman. It seemed that she

started reading an issue only 500 feet from the gate. He saw her and nabbed her.

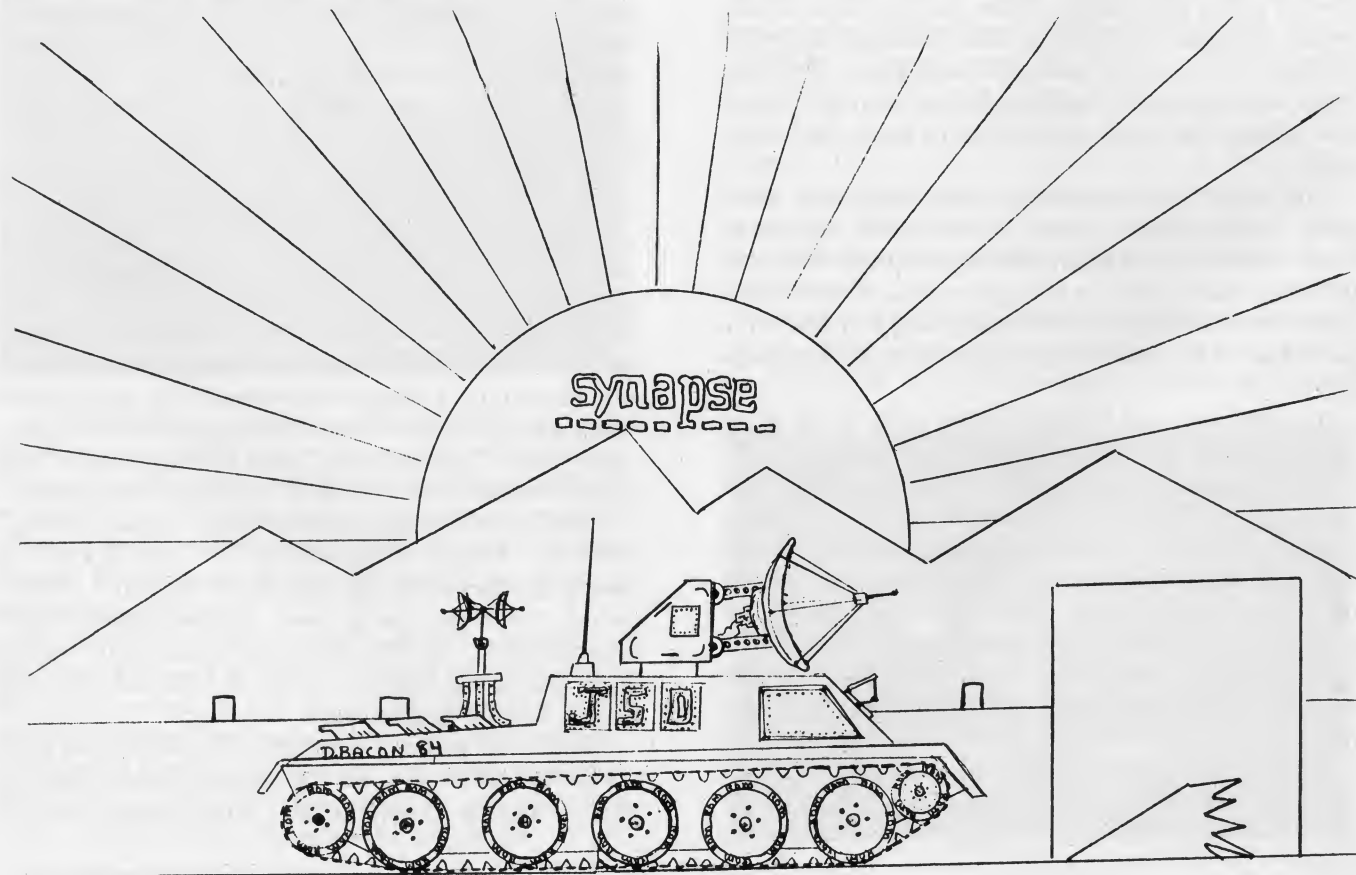
When we later questioned her we found that this whole episode was a fiendish plot for her to rip-off the priceless R.O.M. collection. That Raving Reviewer sure got taken in on this one. Ha, Ha!

DIMENSION X

Playability:8
Challenge:8
Graphics:10
Sound:9
Documentation:9
Overall: 8.8

ENCOUNTER

Playability:9
Challenge:9
Graphics:8
Sound:8
Documentation:8
Overall:9.0



THE RAVING REVIEWER

by Tim Reekie

Exodus-Ultima III

Origin Systems
1545 Osgood St., #7
North Andover, Mass. 01845

It's just too big! What can I say about a program that converts a bunch of wires and circuits into a country far away and long ago, about a program that turns normal Atarian people into Sosarian adventurers searching for a well-hidden secret; about a country so vast and detailed that, in the process of playing, you may forget that Sosaria is only imaginary.

This is a job for the Adventure Duo! I'm not about to attempt to describe Ultima III in-depth. I may as well describe Dungeons and Dragons in-depth. Besides, this is definitely a 'learn-as-you-play' game. Gee, I didn't know thieves could steal as they fight (there goes my bow). Gee, I didn't know there were Gremlins to steal my food (gosh, I'm starving). You learn these things quickly, especially, since with characters at lower levels, death comes rather quickly to those unprepared.

You have come to Sosaria to do battle with their latest menace: EXODUS. In finding this evil-doer, you must overcome such beasts as Orcs, Skeletons, Giants, Dragons, Sea Serpents, Pirates and the higher order of bad guys like Daemons, Arch Daemons and Devils, to name but a few. To overcome these ne'er-do-wells, your party must not only have weapons and armor but must also be balanced. Probably the best combination is Fighter, Ranger, Cleric, Wizard, but you would be advised to develop a strategy and choose a party accordingly (ie: thieves are good for stealing etc.)

There are three places that should be found first (is that possible!?). The first, and most important, is the 'guild shop'. There are a few of these scattered throughout the land. The most important item in this shop is probably the torches, although the other items on the menu each have their uses. However, extended travel in dungeons is impossible without torches.

The next shop on your tour should be the stables (If you can find one!) Here your party may purchase horses which may assist you in outrunning unwel-

comed guests. There are two stables, both of which are exceedingly difficult to find.

The 'Oracle' is the most helpful in understanding what is going on, and therefore, the most expensive. You must already have been to the guild shop before you can get to the oracle.

Each character has four main attributes: strength, dexterity, wisdom and intelligence in creating a character. These four must total 50 points, with no attribute being less than five, or greater than twenty five. During the course of play, these attributes rise towards a pre-determined maximum (depending upon the character's race). This rise comes about through some undetermined means (That is, we haven't figured it out, yet!)

Each character starts at first level and rises one level for every 100 experience points. Experience points are gained by killing your foes, with each foe worth a specified number of points. The character which makes the last blow receives the full amount of points. Each character starts with 150 hit points and this total may rise with subsequent increases in levels; but you'll have to talk to Lord British about this.

Now you know as much about this game as we do, and if you've played the two original Ultimas then you'll probably know more. This brings us neatly to the problems with Ultima III. As its name implies, there were two previous Ultimas, although I haven't actually seen them. Exodus seems to presume a familiarity with Sosaria and the game in general. I've talked to everyone until I am blue in the face (The Guards are polite but boring, while the Jesters are hilarious) and have yet to discover how to raise the attributes of the characters. However, most of what is left out can be figured out, so it isn't too bad.

At the beginning of this review, I said that the program is just too big: I wasn't kidding! Whether it's because of the amount of data being handled, or whether it's some other reason, the game tends to jam every now and then. If your computer has been running for a long period it's more 'now' and less 'then'. The game is saved before entering or exiting cities, castles and dungeons and more directly when "quit" is typed in. The death of a character will also be

recorded immediately while updating the other characters (ie poisoning, food eaten etc).

The jamming up is very frustrating as the game takes at least five minutes to reload.

UPDATE-From the interview with Lord British (Richard Garriot) we learned that Origin has fixed the glitches. So if you have one of the rotten disks, send it back, and Origin will replace it with the new updated version.

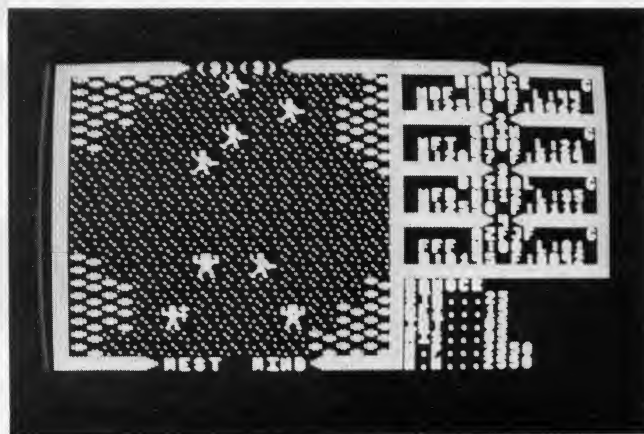
Psst Buddy. . . Wanna Buy a Secret
(Warning)

This small section is designed to give players a few hints what we, through painstaking experimentation, have discovered in our travels. Those of you not desiring any help in your adventures would be well advised to skip the following section.

(1) Do not attack anyone in a town unless you have: a) Horses, b) Powder and c) Quick fingers.

(2) If a battle is going badly and a beloved character is in danger of dying, or if everyone is poisoned and the funds for buying a cure are conspicuous by their absence, turn the computer off. True, the game will have to be re-loaded, but the game will commence from whence it was last saved. Any treasure gained however, will be lost.

(3) Mapping dungeon levels by guesswork is generally



useless. Have a healthy supply of gems to peer into on each level, and in each city, and draw your maps from these.

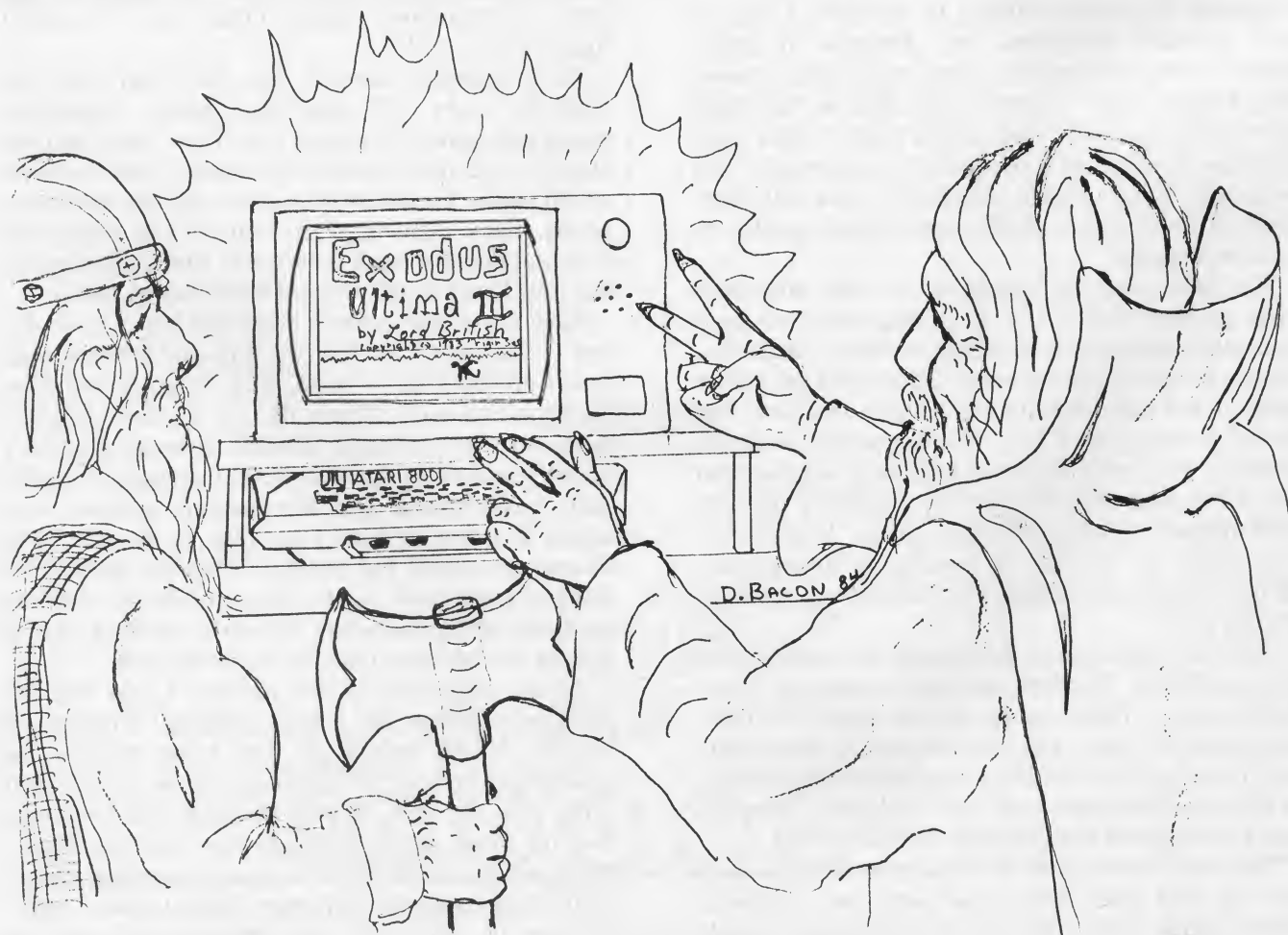
(4) 'V' gets rid of the spell casting theatrics.

(5) The music may be turned down/off by turning the knob on the t.v. set marked "volume". Quite tricky, I know!!

(6) (WARNING) This one is really dirty, and should be attempted only by: a) Ambitious beginners, b) seasoned veterans who have lost their high level character(s), and don't want to rebuild slowly.

(i) Create four characters

(ii) Form party



- (iii) <H>and all food,money, and armor(daggers aren't worth worrying about) to Player 1
- (iv) <Q>uit game
- (v) Turn off computer
- (vi) Reload game;dispersed party,terminate players 2,3,and 4;re-create players 2,3, and 4;goto (ii)

After doing this three times, Player 1 will have 1500 food, and enough gold to equip an army, or resurrect the dead five times over.

Of course, you understand that this is basically cheating, and should only be done in the direst of circumstances. It also takes a bit of time: About five minutes per loop, for experienced keyboarders.(Like Pete)

Okay, all you true-blue adventurers out there my look now.

I intend to have an update of Ultima III in the next issue, so in the meantime, any of you fellow Sosarians out there who'd like to see your name in lights, send in your character name, # of moves, level, and of course, your real name(Exceptionally powerful characters might be tempted to include a photograph as proof!!). Also, if any of you should meet Exodus, send in a photo and it will be printed along with your name in the next issue.

Until then, here are our characters (with a photo) and the ratings for the latest Ultima.



Ratings

Exodus:Ultima III

Playability:9.8

Challenge:10.0

Graphics:9.5

Sound:8.4

Documentation:8.9

Overall Ratings:9.8

P.S. The reason the overall rating is so high is that the challenge and playability are so prevalent that all other factors are completely outweighed.

ZEPPELIN Synapse Software

The rain was spattering against my window it was six o'clock and I had just finished the weekend crossword. I put the pen down and walked into the parlour. No, I didn't fancy billiards tonight, nor did darts seem



an exciting alternative. There was always the Atari. I leaped through my collection of software. Nothing seemed to stimulate my enthusiasm.

"Let's face it", I said (Despondently!) "I'm bored!" With incredible timing, the telephone rang. I picked up the receiver.

"Hello", I ventured, "T.R.R. here".

"Rave?", the voice questioned, "This is Pete I've just acquired a new game and if you're not too busy, I'd like to know if you can make it down to test play it? It's a multiple-player game...uh JSD's already here."

Now right away, I knew something was up. Pete is never that eloquent. But JSD was there! Since that fateful game of "Jumpman" not 6 months ago, that night when the RAVING REVIEWER became the raving reviewer, I had dreamt of revenge.

"Yes, I cried, I'll be there in ten minutes". I was in fact, there in five. Pete was waiting for me in his driveway, the rain had abated to a drizzle. We walked in silence into the house and found JSD in the computer room finishing off the potato chips.

"How does the game look", I inquired, trying my best not to notice the holes in his socks.

"Burp 'scuse me", was the brilliantly inspired reply (Well brought up).

"Dunno", he continued, "Pete hasn't unwrapped 'er, yet." "Ah", I said, turning to Pete, "Well?"

"One Zeppelin coming right up", said Pete, with a strange smile on his face.

"Come again?" asked JSD

"The name of the game", answered Pete, unwrapping the package, "is zeppelin". "Oh!.. got any

more chips?"

While the game was loading in, I began to wonder just what this game entailed.

"Well Tim (I knew I was in for bad news; he never calls me "Tim" except when the news is bad) I may have given you the wrong impression. You see, Zeppelin is a cooperative game".

I was more than slightly taken back.

"You mean, JSD and I are (gulp), are on the . . . I couldn't say it. I looked at JSD. He was busily munching on his new bag of chips, his face impassive.

"Same team, yes", finished Pete. "Of course, I'll be playing too. You see, Zeppelin is a game for from one to four players. We're in a Zeppelin, it seems, uh that's an airship."

"I know what a Zeppelin is, Pete!" I walked to the console and pressed a button. A panel in the wall slid aside effortlessly, revealing Pete's sixty inch television screen. I pressed another button. Instantly Zeppelin was displayed in full color on the screen, with the impressive theme music blasting in quadraphonic sound from somewhere in the walls. An impressive system, to be sure. I picked up my remote control joystick and settled into a comfortable lazy-boy (armchair).

"Yes, well now aboard this Zeppelin we must CO-OPERATE (I could've sworn he said co-operate in capital letters) and get from the seventh level underground to the face of the earth. We get to avoid earthquakes while shooting down enemy airships, balloons, walls and anything else that gets in our way. (JSD's eyes lit up) Oh yeah, there's something here about a Hamburger monster, but I'm not too sure what that's about. "Well are we ready to begin?"

Pete was the pilot: I declined the honor, and JSD would have run into the walls.

The night passed quickly maneuvering through the maze that was Zarkafir was not as easy as it sounded. The earthquakes occurred more frequently and with greater deadliness as we achieved the lower levels. As we approached and passed the wee hours, we had built up a fleet of ten Zeppelins. Wondering how we had built up such an impressive arsenal, I turned to the instructions, while JSD and Pete held down the fort. I discovered that besides there being life pills, which are capable of endowing free lives, and an extra life is also granted for every 10,000 points. Other than that the instructions were pretty basic: switches could turn on or off enemy defenses: keys go into keyholes; hamburger monsters eat the hamburgers. You give them (after which they leave their posts so you can pass). I was brought back to the task at hand quite abruptly.

"You idiot! you're supposed to shoot those earthquake chunks! I'm steering the bleeding thing."

"I thought raving was shooting up"

"No I'm shooting forward", I hollered.

"We've still got nine lives left, no prob." As it happened. It was a prob, as I mentioned, this game gets tougher. The wee hours stretched into the early hours and as with most mere mortals, our co-ordination dissipated until our forays were restricted to the first four levels. Apparently once one has mastered the novice level, one may advance to the advanced and finally expert levels. Our chances of advancing in our present condition was dubious at best. It isn't surprising therefore, that we adjourned for the week-end. wearily, I sat up and reached for my jacket. JSD propped himself up and a waterfall of chip crumbs cascaded to the floor. Although it was not what I expected, it was a good night of vidioing, and I thought that it was a night well spent as we walked toward the door.

The sun was just dawning through the mist as we emerged from the house. Pete waved his goodbyes and closed the doors. However as we walked to our cars I couldn't help feeling cheated. Don't get me wrong, Zeppelin was an excellent game. The blisters on my thumb and fore finger were evidence of that. All good fast-action games gave blisters on my thumb. No, it wasn't that! I looked across at JSD. He had chip crunbs on his face, his hair was a mess, his shirt wrinkled, and his face impassive, as usual. How could he know how important beating him was to me. That getting the capitals back in my name was priority one. He burped audibly.

"Night J", I sighed as I opened my Maseratti door. As I prepared to slide in, I felt a hand on my shoulder and I turned. He looked quite tired although the chips were wiped from his face.

"Till next time my friend", he smiled, "till next time!"

He turned and I watched him trudge off toward his car until he was lost in the mist.

ZEPPELIN

Playability:9.2

Challenge:8.9

Graphics:9.4

Sound:8.0

Documentation:8

Overall:9.0

Robot Hunt (cont'd)

, 2, 264, 942, 277, 292, 388, 289, 953, 37, 154, 793, 794

2000 DATA 10197, 636, 131, 557, 887, 705, 571, 303, 912, 789, 780, 935, 270, 561, 298, 97, 830, 935

4000 DATA 1674, 800, 874

FORMATTING DISKS

by Bob Cockroft

If you are one who formats as many disks as I do, you are no doubt tired of the DOS method. After all, formatting through the DOS requires many key strokes. Although it may not sound like a lot of work for one disk, any reduction in time will be significant when one is doing many.

The following program is designed to shorten the formatting sequence. Once the user has indicated which drive to use, formatting is done with one key stroke. With the START button as the only command, many disks can be done in a fraction of the time. If your disk is not successfully formatted in the first attempt, the computer will repeat the formatting process. In this rare situation the disk often becomes formatted on the second or third trial. On the few occasions when the disk is rejected, the RESET button must be pressed in order to end the program.

The formatting routine is started by using the general input/output statement(XIO).

XIO 254,#1,0,0,"D1:"

The XIO command has many different functions besides formatting. An entirely new and faster DOS can be created using this function. In fact, this has already been done in a previous issue.(refer to Quick DOS in ROM issue 4) All that is needed is the number that represents the command to be performed. Below is a table of some of the more important XIO commands and their corresponding numbers.

CommandNumberexplanation

OPEN	3	makes devise accessible
CLOSE	12	closes an open file
STATUS	13	call status routine from a devise
DRAW	17	same as DRAWTO
FILL	18	drawing routine
RENAME	32	X I O
32,#1,0,0,"D:THISTO.THAT"		
DELETE	33	erases file
LOCK	35	locks file
UNLOCK	36	unlocks file
POINT	37	specifies where the next byte will be
NOTE	38	stores disk position
FORMAT	254	reread article

```

120 GRAPHICS 0
140 DIM WA$(5)
160 SETCOLOR 2,16,1
180 POKE 752,1
200 ?
220 POSITION 4,2
230 REM ** DETERMINE WHICH DRIVE
**
240 ? "FORMAT which drive(D1,D2,D
3,D4)"
250 INPUT WA$
270 IF WA$="D1" OR WA$="D2" OR WA
$="D3" OR WA$="D4" THEN 300
272 POSITION 3,3
275 ? "D1,D2,D3 OR D4"
278 FOR X=1 TO 750:NEXT X
280 POSITION 3,3
285 ? " "
290 GOTO 220
300 POSITION 0,6
320 ? "Press START to FORMAT on d
rive ";WA$
325 POSITION 10,20
330 ? "Press OPTION to end"
335 IF PEEK(53279)=3 THEN END
340 IF PEEK(53279)<>6 THEN 335
344 POSITION 14,10
345 ? " "
347 POSITION 10,15
348 ? " "
350 POSITION 12,10
352 ? " FORMATTING! "
355 REM ** START FORMATTING **
360 XIO 254,#1,0,0,WA$
378 POSITION 12,10
380 ? "DISK FORMATTED"
400 ?
420 POKE 77,0
480 ?
490 POSITION 10,15
530 POSITION 4,2
540 ? " "
550 POSITION 2,3
560 ? " "
570 POSITION 34,6
580 ? "again"
700 GOTO 300

```

Beginner's Line (cont'd)

moment and look at the variable name table. First, we have to get the program back, so type RUN and press RETURN. Now we are back to normal. Notice that the numbers have not increased again. Modify the immediate action line again using the number next to the START OF VARIABLE NAME TABLE for (LOWNUM), and take 1 off the number against the START OF VARIABLE VALUE TABLE for (HINUM). Now go over to CHR\$(32); and CTRL delete 9 times to get rid of it. Now hit RETURN. There is the list of all the variables used in the program. BASIC knows where each variable ends, because it adds 132 (sets bit 8) to the last letter which gives us the inverse display.

I hope this has been an interesting look 'under the hood' of BASIC storage. We will have further use for this information as we continue with our 'GOING TO TOWN' project. That's enough to byte on for now. See you again in the next issue!

Cover (cont'd)

, 14, 34, 475
1350 DATA 3411, 45, 27, 43, 45, 59, 852
, 731, 136, 135, 177, 179, 45, 182, 196, 1
83, 186, 190
3100 DATA 8219, 175, 183, 864, 988, 98
5, 980, 540, 353, 373, 748, 340, 30, 639,
32, 989

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Product Reviews (cont'd)

I loved the light pen but was disappointed with the fact that only a small number of colors were available. That being my only disappointment, I can recommend this software/hardware package to all Atari owners, and would-be artists. (The pen is also available for most popular computers.) The package contains the program disk, a clear, (short) precise instruction manual, and the light pen which plugs into the joystick port.

Oh yes, there is something I forgot to mention, if you make an error in your drawing, you can selectively erase the offending portion of your picture. My son showed me how when he said, 'Look daddy, the colors are going back into the pen!' The light pen can be bought directly from: Tech-Sketch Inc., 26 Just Road, Fairfield, NJ 07006.



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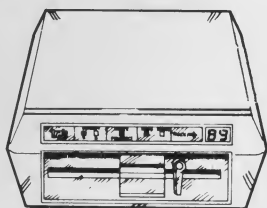
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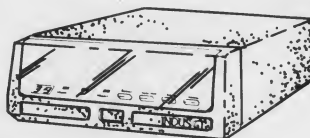
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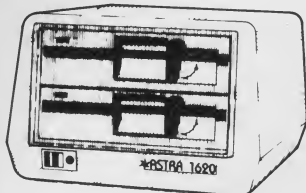
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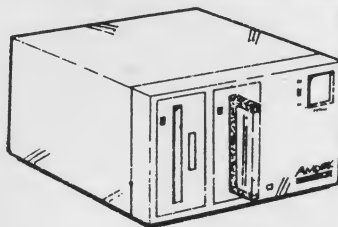
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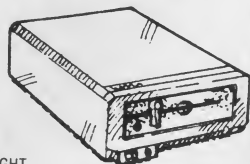
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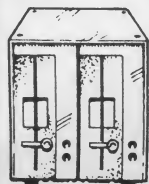
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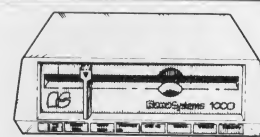
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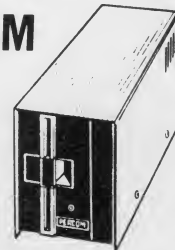
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